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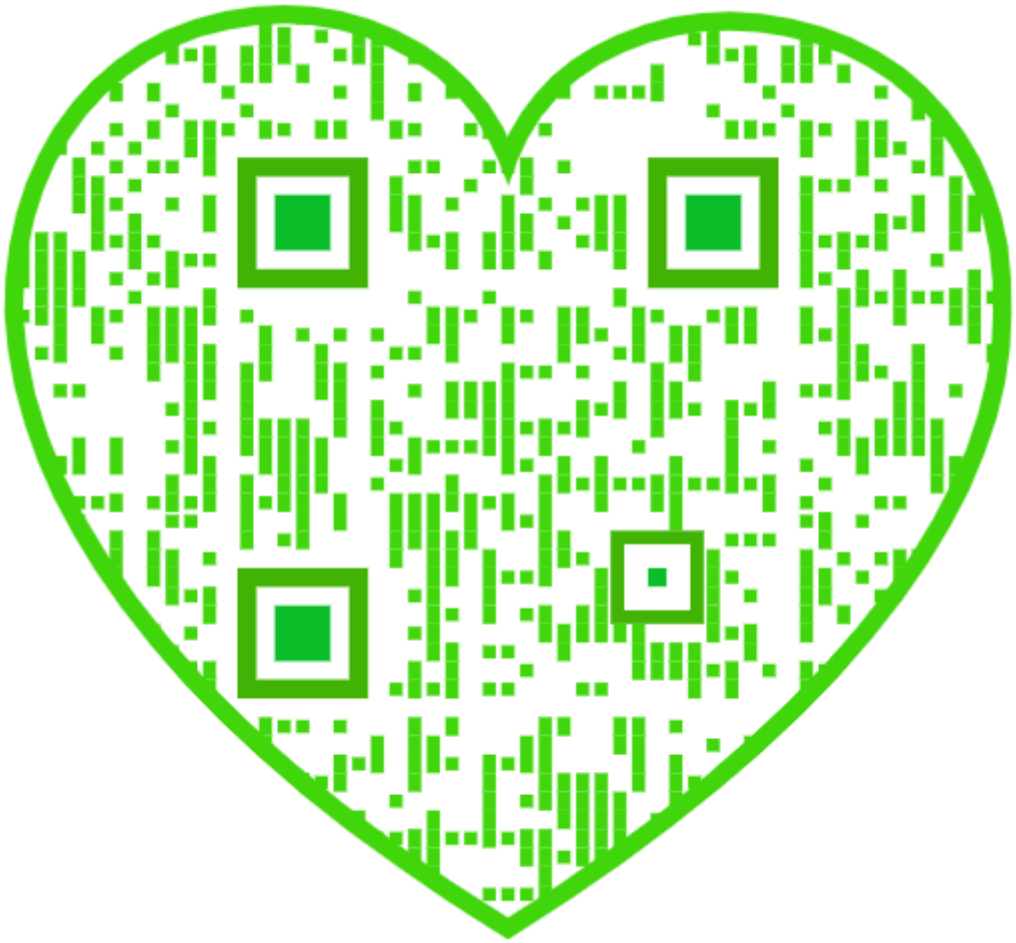

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"A WINTER AFTERNOON"
J. S. Neary, Trenton, N. J.

American school of art and photography.

Library of Amateur Photography

VOLUME II

Negative Making, Printing, Copying, Enlarging, Retouching

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TABLE OF CONTENTS

VOLUME II.

CHAPTER I. PAGE

DRY PLATE DEVELOPING 9
INTRODUCTION 9
BRIEF GENERAL INSTRUCTION 10

CHAPTER II.

DRY PLATE DEVELOPING—DETAIL INSTRUCTION 13

CHAPTER III.

DIFFICULTIES—DRY PLATE DEVELOPING 39

CHAPTER IV.

DEVELOPING UNDER-EXPOSURES 49
DIFFICULTIES 57

CHAPTER V.

GENERAL NEGATIVE INTENSIFYING 63
DIFFICULTIES 70

CHAPTER VI.

LOCAL INTENSIFYING 73
DIFFICULTIES 76

CHAPTER VII.

DEVELOPING OVER-EXPOSURES 81

CHAPTER VIII.

DIFFICULTIES—DEVELOPING OVER-EXPOSURES 91

CHAPTER IX.

ADVANCED DEVELOPMENT OF OVER-TIMED PLATES 99

CHAPTER X.

GENERAL NEGATIVE REDUCING 105

CHAPTER XI.

LOCAL REDUCING 121
DIFFICULTIES 127

CHAPTER XII.

Universal Developing 131
Difficulties 140

CHAPTER XIII.

Special Pyro Developing for Commercial Photography.. 143

CHAPTER XIV.

Developing or Gaslight Papers—Introduction..... 153

CHAPTER XV.

Printing and Developing—Brief General Instruction 157

CHAPTER XVI.

Printing and Developing—Detailed Instruction.... 163

CHAPTER XVII.

Difficulties—Manipulating Gaslight Papers..... 179

CHAPTER XVIII.

Special Printing and Developing of Gaslight Papers 185

CHAPTER XIX.

Difficulties—Special Printing and Developing..... 201

CHAPTER XX.

Sepia Tones on Gaslight or Bromide Papers..... 205

CHAPTER XXI.

Post Cards—Gaslight Paper 211

CHAPTER XXII.

Copying With Hand or View Camera..... 215

CHAPTER XXIII.

Copying With Hand or View Camera—Detailed Instruction 221

CHAPTER XXIV.

Difficulties—Copying 233

CHAPTER XXV.
Bromide Enlarging by Daylight or Artificial Light 237

CHAPTER XXVI.
Grades of Bromide Paper and Their Use 245

CHAPTER XXVII.
Brief Instruction for Bromide Enlarging With the Enlarging Lantern 249

CHAPTER XXVIII.
Daylight Enlarging With a Pocket Film Kodak 251

CHAPTER XXIX.
Daylight Enlarging With the View or Hand Camera—Detailed Instruction 255

CHAPTER XXX.
Home-Made Apparatus Without Condensers 265

CHAPTER XXXI.
Bromide Enlarging—Detailed Instruction 269

CHAPTER XXXII.
Sepia and Green Toned Bromide Prints
Part I—Introduction 285
Part II—Rapid Sepia Tones by the Bleaching and Re-Developing Process 287
Part III—Special Tones on Bromide Paper 291

CHAPTER XXXIII.
General Finishing of Enlargements 293

CHAPTER XXXIV.
Difficulties—Bromide Enlarging 297

CHAPTER XXXV.
Bromide Enlarging Pointers 301

CHAPTER XXXVI.
Negative Enlarging—Introduction 305

CHAPTER XXXVII.
Negative Enlarging With Large Camera 311

CHAPTER XXXVIII.
Negative Enlarging With a Bromide Enlarging Apparatus 315

CHAPTER XXXIX.
Difficulties—Negative Enlarging 323

CHAPTER XL.
Negative Retouching—Introduction 327

CHAPTER XLI.
Negatve Retouching—Preparatory Instruction 333

CHAPTER XLII.
Negative Retouching—General Explanations 347

CHAPTER XLIII.
Negative Retouching—Applying the Lead to the Regular Negative 353

CHAPTER XLIV.
Difficulties—Removing Imperfections on Negatives 361

CHAPTER XLV.
Negative Retouching—Blending 365

CHAPTER XLVI.
Difficulties—Blending 375

CHAPTER XLVII.
Retouching Landscape and Architectural Negatives 377

CHAPTER XLVIII.
How the Studies Illustrating This Volume Were Made 389

ILLUSTRATIONS

Illus. Number	Title	Page	Par. Ref.
1, 2	Simple Method of Ventilating a Dark-Room	14	11
3	Floor Plan of a Convenient Dark-Room	15	14
4	Sectional View of Convenient Dark-Room	16	15
5	Plate Washing Tank	18	16
6	Section of Dark-Room Used for Bromide and Negative Enlarging	21	20
7	Example—Correct Exposure	101	245
8	Example—Over-Exposure Corrected by Proper Development	101	245
9	Print from Over-Exposed and Over-Developed Negative, One-Half of which is Reduced	115	284
10, 11	Before and After Reducing	115	284
12	Example of Overcoming Halation in Interior Photography	145	364
13	Printing Light in Dark-Room	166	417
14	Copying Apparatus	216	594
15	Example of Enlarging Lantern	243	664
16	Ingento Enlarging Lantern	250	681
17	Enlarging Frame to Hold Kodak	252	686
18	Kodak Attached to Frame	252	689
19	Kodak in Position	253	690
20	Enlarging Box for Daylight	256	695

Illus. Number	Title	Page	Par. Ref.
21	Enlarging Apparatus for Artificial Light	257	698
22	Condensing Lens	259	704
23	Home-Made Enlarging Apparatus	264	708
24	Copying Apparatus for Negatives and Lantern Slides	312	902
25	Faber Pencil Holder and Leads	338	971
26	Retouching Desk	339	973
27	Reproduction of Negative Before Retouching	343	980
28	Reproduction of Negative Retouched	344	980
29	Print from Unretouched Negative	345	980
30	Print from Retouched Negative	346	980
31	Holding the Pencil and Etcher	350	988
32	Pencil for Marking on Glass	385	1088

STUDIES AND HOW THEY WERE PRODUCED

Study Number	Title	Author	Study Page	How Made Page
	A Winter Afternoon	J. S. Neary	Frontispiece	
1	Old Cedars	J. S. Neary	25	
2	Woodland Mist	Wm. T. Knox	43	389
3	Morning Lights and Shadows	J. H. Field	61	389
4	At Peace	Dr. A. R. Benedict	79	389
5	Sheep	W. E. Bertling	97	390
6	Marine	S. I. Carpenter	119	
7	Snow Lights	Geo. H. Sheer, M.D.	137	390
8	On the Frozen River	John Chislett	191	391
9	Portrait	E. A. Brush	192	391
10	Outdoor Portrait	Mathilde Weil	223	391
11	Knitting	Mrs. Nancy Ford Cones	239	391
12	The Splinter	Mrs. Nancy Ford Cones	263	391
13	East is East and West is West	W. H. Phillips	275	392
14	The Last Sheaf	H. B. Conyers	289	392
15	"Marguerite"	Will H. Walker	307	392
16	Study	Alfred Holden	317	392
17	Portrait Study	B. J. Falk	349	
18	Child Portrait Study	J. Will Towles	367	
19	Portrait Study	John H. Garo	368	

CHAPTER I.

DRY PLATE DEVELOPING.

INTRODUCTION.

After the exposure has been made on the plate or film there is still no visible image, and it is necessary to employ some means of changing the invisible image to a visible one, and, in so doing, make it possible to utilize this image as a means toward an end — which end is the finished print.

The sensitive silver salts in the emulsion of the plate or film have undergone an invisible change when exposed to the action of the rays of light — some of the particles have been affected by the light, while others remain as they were. It will be found when this exposed plate, or film, is placed in a solution composed of some oxidizing agent, called a developer, that a change takes place in the color of these light affected particles and they are thus rendered visible to the eye, and may also be built up to form an image varying in density according to the amount of the light action on the sensitive emulsion.

White objects, of course, affect the sensitive plate or film to a much greater extent than dark objects; therefore, those portions of the emulsion representing white objects will be much denser than the sections representing the shadows, and the degrees of light and shade between these two extremes (called half-tones) will be represented in that degree in which they affect the sensitive salts in the emulsion. In a general way, the developer is the agent which acts upon those portions of a sensitive substance which have been exposed to the

light. One of the most popular, as well as satisfactory, developing agents is pyrogallic acid; therefore, the fundamental training, which is to receive first consideration, will embody this developer.

BRIEF GENERAL INSTRUCTION.

1. **Apparatus and Material.**—It is essential, in order that accurate results be obtained and that waste material be reduced to a minimum, that you provide yourself, first with a room that is totally dark; a suitable ruby lamp; a supply of clear water; four trays; a graduate; etc.; also the necessary chemicals for mixing the developing solution, and the fixing bath. (See Pars. 8 to 13 of the Detailed Instruction on DRY PLATE DEVELOPING.)

2. **Developing.**—Prepare the developing solution according to the formula given in Par. 47, and in the manner described in Par. 49, and place in a graduate a sufficient quantity of this normal solution to thoroughly cover the plate or film. Close the dark room door and be sure that all rays of white or actinic light are excluded from the room. No light should be in evidence, with the exception of that from the ruby lamp. The developing tray should be rinsed with clear water and allowed to drain for a few seconds; then take the exposed plate and dust it carefully to remove the dust that might adhere to its surface. Now place the plate in the tray, with the film or emulsion side up. Holding the tray in the left hand, take the graduate of developer in the right hand, and, beginning at the end of the tray furthest from you, pour the developer quickly, yet carefully, over the plate, at the same time drawing the graduate towards you—in this way there will be an even "sweep" or flow of developer going over the negative and driving off of the surface of the emulsion all air. If this manipulation is carefully carried out no air-bells will form on the surface of the plate. Rock the tray gently and, although protecting the plate from the direct rays

of ruby light, watch for the first appearance of the image, which in the case of a normal exposure should be from twenty-five to forty seconds. (Before proceeding with the actual development you should read carefully the Detailed Instruction regarding the THEORY OF DEVELOPING, also the PROCESS OF DEVELOPING which follows.)

3. **Rinsing.**— After the plate has been developed it should be rinsed in clear water for a couple of minutes in order to remove all superfluous developer from the emulsion. The negative is now ready to be fixed.

4. **Fixing.**— The fixing bath should be prepared previous to developing, and should be made in accordance to the directions given in Par. 57. When the plate has been fully developed and rinsed in water it should be placed in this fixing bath until all traces of the unacted upon sensitive salts have been removed. The theory of fixing is very fully described in Pars. 26 and 27.

5. **Washing.**— When the plate has been fixed it must be washed for half an hour either in running water or in six to ten changes of water. Great care must be given to the final washing, as it is very essential that not only the hypo be removed but that all chemicals be thoroughly washed out of the emulsion, so that nothing but the metallic silver image remains.

6. **Drying.**—The plate should be dried in a draught if possible, yet be sure there is no dust in the air, for any particles which come in contact with the gelatine emulsion will adhere to it. The temperature of the room should not exceed eighty degrees. It is advisable to have the plate dry in from two to four hours.

7. **Preserving the Negative.**— When the negative is dry it should be placed in a negative preserver (manila envelope) and full data recorded on the outside of the envelope. Important items which might be included in this data are: subject, brand of plate, weather conditions, make and speed of lens, size of diaphragm, exposure, developing agent or developing formula, and other information of value for future reference.

CHAPTER II.

DETAILED INSTRUCTION.

DRY PLATE DEVELOPING.

NOTE TO BEGINNERS.—In the following instruction wherever the word "plate" is used "film" may be substituted.

---

8. **Dark Room.**—The first point to consider in the developing of the dry plate is the room in which you are going to develop, commonly called the dark room. This is somewhat of an erroneous term, as the room must not necessarily be dark, as the term would imply, but only in a chemical sense. By a dark room we mean a room which, when the door is closed, is free from any actinic light. The only light in the room must be produced by the dark room lamp, or window, commonly called the ruby light; a combination of ruby, orange and yellow, which is non-actinic, but only to a certain extent. The dry plate of to-day is more or less affected by all colors. You should, therefore, never place a plate while changing or developing too near your ruby light. You can examine your plate occasionally by holding it up close to the ruby light, but only for a few seconds at a time.

9. **Dark Room Light.**—Besides the quality, the quantity of light must be considered. You should always employ artificial light, as daylight is apt to vary. If you are not going

to use a regular dark room lantern, over your sink you should have a window. In this window place your combination of ruby, yellow and orange glass. On the outside place a shelf for the light. On this you can place your lamp or adjust the gas jet or electric light. This will keep the heat out of the dark room.

10. **Size of Dark Room.**—In a professional studio where a large amount of developing is to be done, the dark room should be fairly large. It is a mistake to suppose that a small closet or cupboard will do, as it would be extremely injurious to the health of those who were compelled to remain in such a small room for any length of time. For the amateur who only develops a plate at a time, a small dark room is perfectly safe and practical; but in either case the dark room should be kept perfectly clean and there should be a place for everything and everything in its place.

11. **Ventilation.**—In preparing a perfect dark room, ventilation should also be considered. There should be an outlet for foul air at the top of one of the walls. It should be so arranged that the foul air can be let out without letting in light. (See Illustration No. 1.)

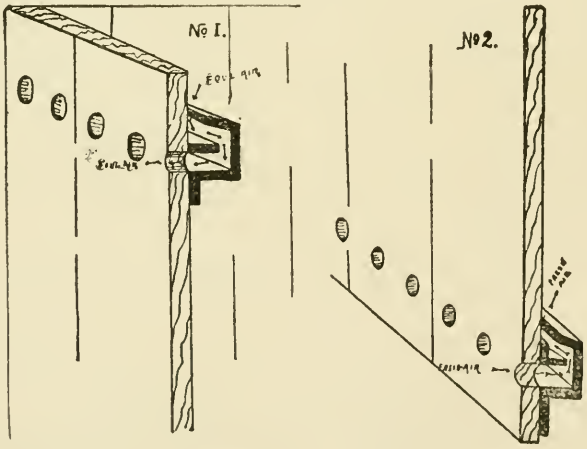

Illustration Nos. 1 and 2
Simple Method of Ventilating a Dark Room
See Paragraph No. 11

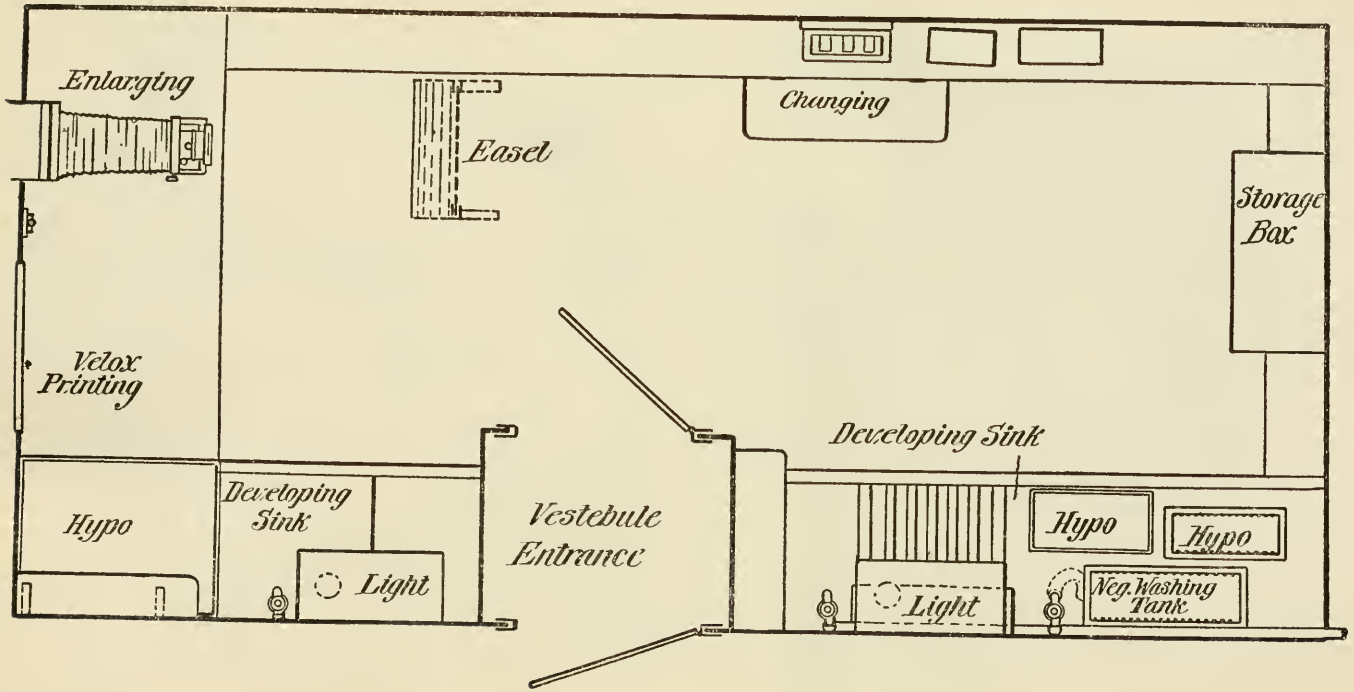

Illustration No. 3
Floor Plan of a Convenient Dark Room
See Paragraph No. 14

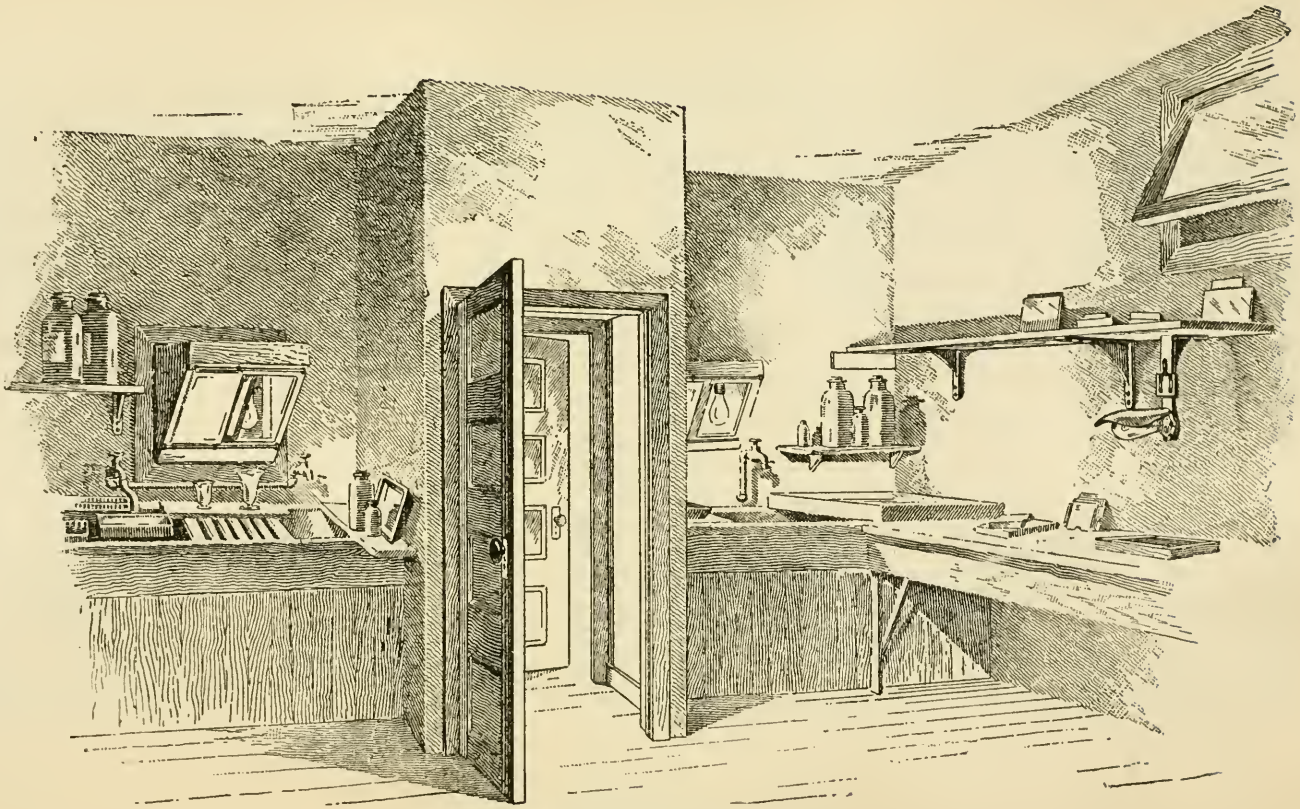

Illustration No. 4
Sectional View of Convenient Dark Room
See Paragraph No. 15

There should also be an inlet for the fresh air, and this may be provided by piercing a number of holes at the bottom of the door and arranging a hood over them. (See Illustration No. 2.)

12. **Developing Outfit.**—The room should contain, besides the sink with a tap above it, a table and several shelves, four developing trays, one fixing box, one washing box, one 16-ounce graduate, one 4-ounce graduate, one minim glass, one hydrometer, one stirring rod; several large mouthed glass stoppered bottles, one 64-ounce for sulphite ot soda stock, one 64-ounce for carbonate stock, one 36-ounce for pyro stock and one 36-ounce to hold old developer, one camel's hair dusting brush, a pair of scales and negative racks.

13. **Chemicals.**—The following chemicals are necessary: Carbonate of Soda, Sulphite of Soda, Hypo-Sulphite of Soda, Pyro, Sulphuric Acid, Nitric Acid, Red Prussiate of Potash, Persulphate of Ammonia, Bromide of Potassium and Bichloride of Mercury.

14. **A Convenient Dark Room.**—The accompanying illustration No. 3 gives the floor plan together with the dimensions of a very convenient combination dark room. This room can be used for all the different photographic processes requiring a room which is totally dark. The size of the room is 10 x 20 feet. Access to the room is made through a vestibule double door without admitting any light. Both doors are fitted with heavy spring hinges so that when entering or leaving, the first door is closed before the second one is opened.

15. **Developing Sink.**—Space has been allotted in each section of the room for certain particular work, such as the loading of the plate holders, developing and fixing plates, making gaslight prints, making bromide and negative enlargements, etc. The side of the room including the vestibule entrance and the two large sinks on either side is illustrated in Illustration No. 4.

The sink to the left which is nine feet long, is used for developing and on account of its size is very convenient for the general manipulation of plates and films. Across the top and on a level with the sink is arranged a movable rack

twenty-four inches long by the width of the sink, upon which to rest the developing tray while developing. This rack is made of one-inch square strips.

16. **Washing Box.**—The washing box for 5 x 7 and 8 x 10 plates should be placed in this sink and a very convenient one may be easily constructed of one-inch pine lumber

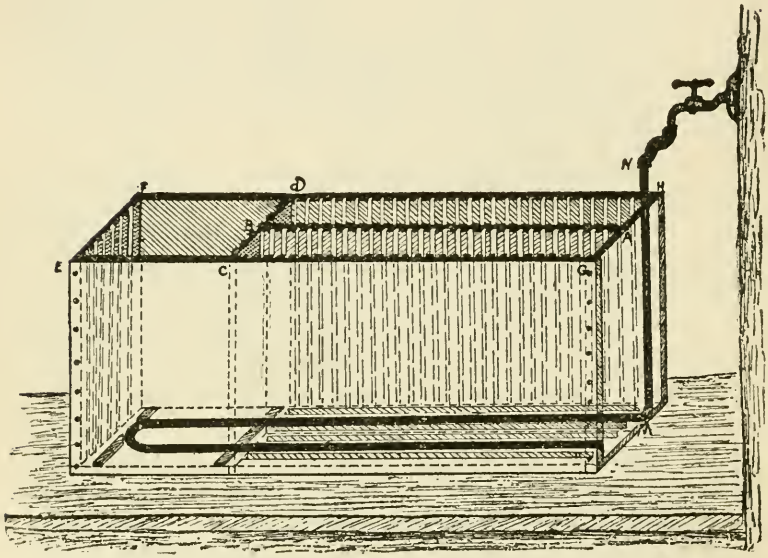

Illustration No. 5
A Plate Washing Tank
See Paragraph No. 16

according to the following instructions:—The length of the box on the inside should be thirty inches, while the width should be eleven inches. Nine and one-half inches from one end of the tank place the partition *C*, *D*, and equally divide lengthwise the remaining larger section by the partition *A*, *B*. Both sides of this partition, *A*, *B*, should contain grooves one-fourth inch deep and one-half inch apart and the side of the box *H*, *D*, and *G*, *C*, should also be grooved as well as

the end *B*, *F*, and the side of partition *C*, *D*, which faces the smaller section of the washing box. There will now be three divisions, two to accommodate 5 x 7 or 4 x 5 plates, and another for 8 x 10 plates. A U-shaped piece of lead pipe, perforated on the sides with small holes, should be placed in the bottom of the tank before inserting the partitions. The pipe should enter the tank at one end at the point marked *M*, and if properly placed it will come in the center of each of the divisions made for 5 x 7 plates. On each side of the pipe is placed wooden strips for the plates to rest on. On the outside of the box at *M*, the pipe turns upward and extends a few inches above the top of the box and is connected to a faucet with a short piece of rubber hose. (See illustration No. 5.) In addition to the washing box there are two rubber hypo tanks — for fixing 5 x 7 or 8 x 10 plates.

17. **Developing Light.** — The developing light is constructed so that the front is bevel shaped, for in this way it throws the light downward upon the developing tray. The front of this light has two sliding windows, one containing ruby glass and a sheet of P. O. paper, while the other frame is fitted with ground-glass. During development the ground-glass may be shoved back out of the way and the ruby light used, but when development is completed the ruby light frame can be slid back and the ground-glass frame drawn over in its place and the negative examined by it.

18. **Shelving.** — A very important item in any dark room is the proper arrangement of the shelves. These should be placed in convenient location and each shelf contain certain articles. For instance, the shelves over the developing sink should contain the developing solutions and other bottles, graduates, trays, etc., while the shelving at the end of the room where gaslight prints, bromide enlargements, etc., are made, should be reserved for paper and negatives and those over the changing light for storing dry plates, plate holders, etc. Always keep the same material on the same shelf and in exactly the same location so that when you have formulated this system you will be able to locate any material that you might desire, even though the room is in total darkness.

19. **Department of Printing and Developing.**—On the right hand side of the vestibule is another large sink over which is placed a ruby light similar to the one previously mentioned. The glass in front of this light is, however, of an orange color suitable for developing papers, but the window is fitted in a similar manner to the front of the negative developing light, so that white light may be admitted when desired. The developing is done at the left end of this sink, while at the right hand, in the corner, is placed a large hypo tray 25 x 30 inches in size. This tray is large enough to hold prints 20 x 24 inches and may be used for fixing bromide enlargements as well as velox and other developing papers. Across the narrow end of this room is placed a table three feet deep. Near the center, and far enough away from the developing sink, is a thirty-two candle power incandescent electric bulb, which is operated with a switch and is used for printing gaslight papers. A tin reflector is placed directly over the electric bulb. Directly over this light near the ceiling is a ventilating window which may be opened when the dark room is not in use in order to allow a thorough change in the atmosphere of the dark room.

20. **Enlarging Department.**—The side of the room opposite the developing sinks and the vestibule is shown in illustration No. 6. This side is shelved and used for storing dry plates, negatives, etc. It is also used for making bromide and negative enlargements. Directly opposite the vestibule entrance and over the drop-table, is a changing light. Underneath this light the plate holders are loaded and unloaded. The light falls directly upon the plate holder, thus enabling one to see sufficiently to load and dust the plates. At one side of the ruby light, under the upper shelf, is a storage box for 5 x 7 or cabinet size exposed plates. On the front of this box is a heavy lid attached at the top with a heavy spring hinge, which keeps the lid closed tightly after placing the exposed plates in the box In order to facilitate the loading of plate holders, to the right on the changing shelf are two boxes containing dry plates (taken from their original pasteboard boxes),

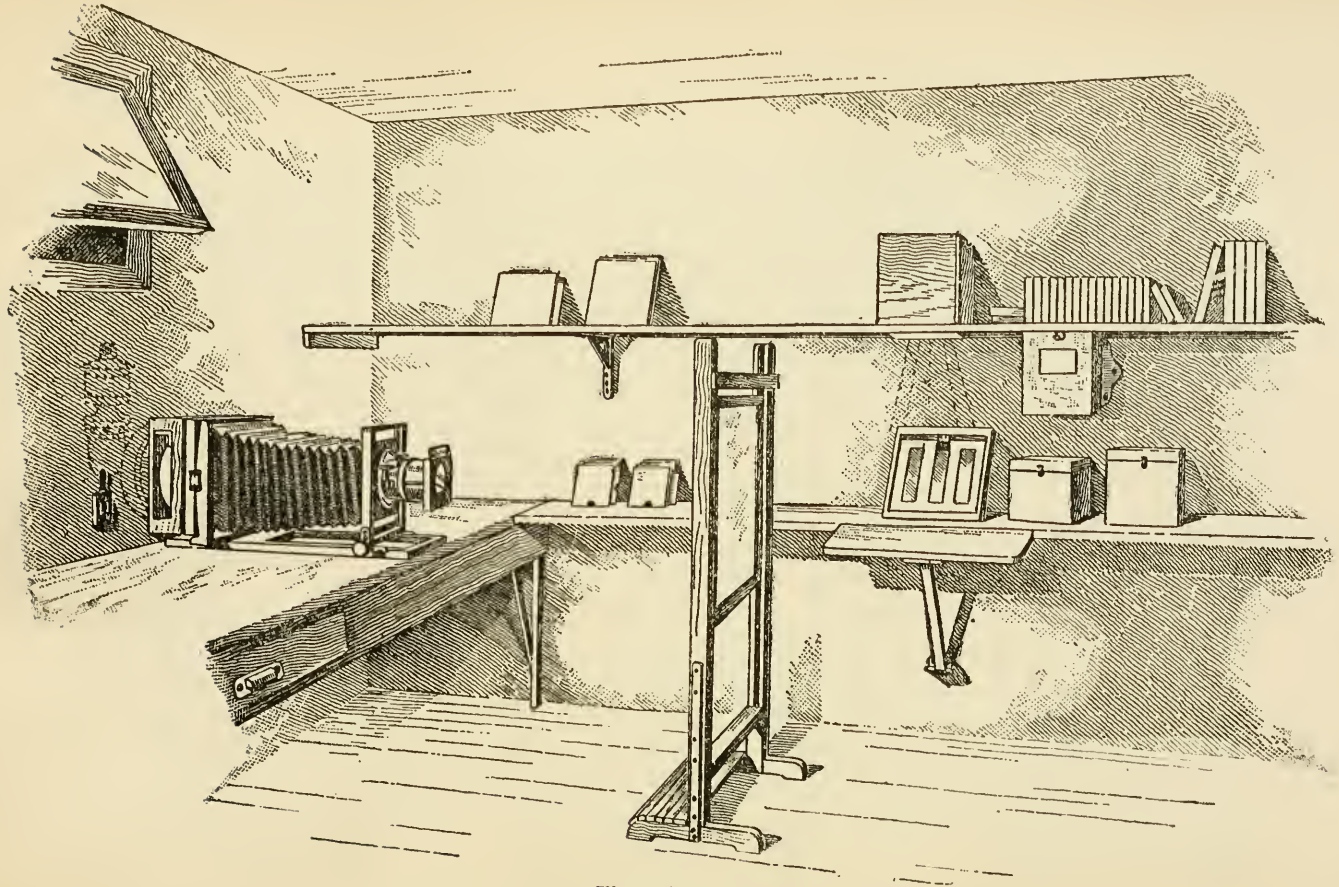

Illustration No. 6
Section of Dark Room Used for Bromide and Negative Enlarging
See Paragraph No. 20

ready to be placed in the plate holders — one box is for 5 x 7 and the other for 8 x 10 plates.

21. **Bromide and Negative Enlarging.**— When this side of the room is used for negative and bromide enlarging, the table employed for changing plates is dropped in order to make room for the enlarging easel. The enlarging camera is arranged on the previously mentioned table at the end of the room. An opening is cut in the partition to admit the condensing lenses, which are fitted in the wall and the camera is fitted flush to this partition. The electric arc light used for enlarging is hung on the outside of the wall and is operated by a switch from the inside. As the length of the room is twenty feet, an enlargement of any size can be made.

22. **Theory of Developing.**— We will next consider the process of developing and the action of the developer upon the exposed plate. When you have made your exposure and placed your plate in the developer, the developing agent builds up and renders the latent image visible. When the plate was exposed in the camera no visible change took place on the sensitive surface, still some parts were affected by the light, while other parts remained unchanged.

23. When the plate is placed in the developer it may merely change the color of the light affected parts, and render them visible to the eye, or it may build up an image on the plate. In other words, the developer is the agent which exerts an action upon the portions of a sensitive plate which has been exposed to the light, and has no effect on the parts which have not been exposed.

24. In the pyro developer the action of the pyro is assisted by an alkali, such as carbonate of soda. When you expose a dry plate to the light you have a certain amount of silver sub-bromide. Immerse this plate in plain pyrogallic acid, and there will be little or no change, but if a small quantity of alkali is added, the image will begin to develop and the plate will blacken rapidly, forming a metallic silver; therefore, it is necessary that a certain amount of alkali must be used in the developing of the plate.

25. The action of the carbonate of soda is to open the pores of the emulsion. If the action is too rapid (and this would be the case if too strong or too much carbonate of soda was used) the pyro would penetrate the emulsion too rapidly and too deeply, and would then stain the film, and you would produce a yellow negative. To offset this and prevent staining, sulphite of soda is added. The carbonate is termed the accelerator and assists the pyro in developing, while the sulphite is the preservative of color; therefore controls the color of the negative.

26. **Theory of Fixing.**— The agent universally adopted for fixing both plates and paper is hypo-sulphite of soda. A sensitive emulsion of chloride, or iodide of silver, on which has been formed an image, either with or without the aid of the developing agent, must pass through this process to render it indestructible by diffused light. It is true that the image itself is sufficiently permanent, and it cannot be said, in correct language, to need fixing. The unchanged silver salts surrounding it are still sensitive to the light, and tend to be decomposed in their turn, and so the picture is lost. It is, therefore, necessary to remove these salts by applying some chemical agent capable of dissolving them. In order that a chemical may be employed with success as a fixing agent, it must produce no injurious effect upon the silver salts which have been affected by the light. Hypo-sulphite of soda is employed not only on account of its having these safe qualities, but because it is economical. The fact that the silver contained in an ordinary fixing bath is present in the state of hypo-sulphite must be borne in mind, because this salt is liable to undergo peculiar chemical changes. Iodide of silver is dissolved by hypo more slowly than chloride of silver, and the amount eventually taken up is less. This is explained in the following manner: —

During the dissolving of iodide of silver, iodide of sodium is formed, and this has the effect of acting as a stop to the fixing. In other words, it retards the action of the hypo-sulphite of soda. The time occupied in fixing will, of course,

vary with the strength of the hypo-sulphite of soda solution employed.

27. The process of fixing is simply the dissolving away of the sensitive salt unacted upon by the light. We recommend the plain hypo bath for the following reasons: The addition of any acid to the hypo-sulphite of soda may cause chemical changes. It first displaces the chemical hypo-sulphurous acid from its combination with soda. This acid begins to decompose, and splits up into the sulphurous acid, remaining dissolved in the liquid, and giving the characteristic odor of burning sulphur. Sulphur which separates in a finely divided state forms a milky deposit. In other words, sulphurization has been produced, and a plate fixed in this bath will discolor, and the image will probably fade away entirely in time. It will also harden the emulsion, and it is next to impossible to doctor successfully a plate fixed in a bath of this kind.

28. **Discoloring of Hypo Bath.**—A strong fixing bath should always be used for fixing plates. To more fully understand the reasons for this, let us study the peculiar properties of this salt (hypo-sulphite of soda). Suppose we were to dissolve sixteen grains of nitrate of silver in one-half ounce of water and twenty-four grains of hypo-sulphite of soda in one-half ounce of water, and then add one solution to the other. A dense deposit of hypo-sulphite of silver would immediately be formed and rapid changes would take place in this deposit; first, white and curdy, next canary color, then a rich orange-yellow, afterwards a liver color, and finally almost black. This change is due to the sulphuric acid formed by the mixing of the silver and hypo-sulphite of soda. The black deposit is sulphide of silver, the yellow and orange being in the early stages of decomposition. This will explain why a plate fixed in a weak hypo bath is sometimes covered with a brown deposit of sulphide of silver and the hypo bath discolors so rapidly, whereas if a full strength hypo bath has been used the plate will be free of the deposit and the bath will remain clear much longer.

29. When you place your developed plate in the fixing bath you are carrying a certain amount of silver into the hypo.

"OLD CEDARS"

STUDY NO. 1

J. S. NEARY, TRENTON, N. J.

If, therefore, your hypo bath is weak the silver in the plate overpowers the hypo-sulphite of soda and sulphide of silver is formed and the same chemical action takes place as when you mix the silver with hypo-sulphite of soda. A strong hypo bath is, therefore, recommended. The hypo is also more easily eliminated when a strong bath is used.

30. **Developing.**—A plate you believe to be properly exposed should be started in a normal developer. A correctly exposed plate can be completely developed with the solution of normal developer given in this instruction without any alteration whatsoever. It is advisable to always save the last developer used, pouring it into a large mouthed bottle, placing a cover over the bottle to protect it from dust and also from the air. The developer will become discolored, but this need not alarm you, as it will make no difference for the purpose it is intended,—that is, the developing of over-exposed plates. However, it should only be kept from day to day. The developer which you use once as your fresh normal developer, should be used the next time as old developer.

31. It is well to use two trays for developing. Into one tray decant the clear solution of old developer. By clear solution we mean that which is free of particles of film or dirt, but not clear in color. Add to this one-third fresh normal developer. The other tray use for fresh normal developer.

32. **Restraining Development.**—If a plate flashes up quickly, indicating over-exposure, place it in the tray of old developer at once, rocking the tray quickly so that the bromide in the old developer, which was liberated from the emulsion of plates previously developed, will penetrate the plate at once, and check development. The bromide acts as a restrainer, keeps the shadows clear, and allows the highlights to build up. The plate will develop up much slower in this bath, as the bromide acting on the shadows permits the highlights to build up first. Unless plates are very much overtimed, we advise using no other means of restraining than those described above.

33. If you have no old developer on hand, and upon placing the plate to be developed in normal developer it shows

indication of over-exposure, then remove the plate immediately from this bath and if you have a tap of water, run the fresh water over the plate quickly and at once drop four to six drops of a ten per cent. solution of bromide of potassium into the normal developer. Then return the plate to this tray, and conclude the development.

34. **Bromide Solution.**—To make a ten per cent. solution of bromide, dissolve one ounce of bromide of potassium in ten ounces of water. Place this stock solution in a twelve-ounce bottle with cork stopper, and split the cork to the center. If it fits too tightly you may cut a little notch in the side and again insert the cork tightly, and you will find when the bottle is turned bottom side up, the solution will drop from the cork very nicely and will be a very convenient way for measuring the required number of drops quickly. The bromide of potassium when used in the developer prevents oxydization of silver in those parts of the sensitive plate on which the light has not acted. For example, the shadows. It also retards the oxydization on the parts on which the light has acted. For instance, the highlights, white draperies, etc., etc. If one is quite sure that a plate is over-exposed, a drop (or no more than two drops) of bromide can be added to the normal developer before placing the plate into it to be developed. This will slightly restrain the shadows and a more brilliant negative will be the result. A plate placed in a fresh developer, which from the start contains two drops of bromide, will restrain the plate more than six drops of bromide if added to the developer after the plate has been once started in normal developer.

35. **Action of Old Developer.**—When a gelatine-bromide plate (dry plate) is exposed to the action of light, the sensitive film undergoes a change, the elements of which it is composed (silver and bromide) lose their affinity for each other and a state of incipient decomposition is set up. If the exposed plate is then subjected to the action of a developer, for instance, pyro, and all developers have a reducing power over modified silver bromide, the action of the light is continued and intensified by further decomposition of the molecules of

the film impressed by light. This continuing of action constitutes development, and by it the image impressed on the film is made visible, a dark deposit of silver resulting from the application of the developing agent in those parts of the silver affected by light in proportion to the intensity of the light action. When the developer is too strong, we have a general reduction of silver over the entire sensitive surface, resulting in what is commonly called chemical fog. The bromide in the sensitive dry plate is really bromo-iodide of silver; originally it was bromide of potassium and iodide of potassium, but when they became a part of the nitrate of silver, they, by decomposition, became bromo-iodide of silver.

36. The principal difficulty, therefore, to overcome in developing an over-exposed plate is chemical fog. While bromide added to the normal developer will prevent this to a certain extent, yet the development is prolonged considerably and the action of even the ruby light upon the plate has a tendency to fog, while if old developer was used (one which has become thoroughly ripened and which contains bromide liberated from previous plates developed) the color of this developer over the plate protects it from the continuous action of the light during prolonged development and with less likelihood of fog. Therefore, the use of old developer is preferable to normal developer with fresh bromide added.

37. **Snap and Crispness.**— It is well after a plate has been developing in the old or restrained developer for some time, to place it in a fresh normal developer in order to give snap and more crispness, always being careful to rock the tray. The rocking of the tray must not be all in one way; first rock from you, and then from side to side. The action of the normal developer is apt to be quite rapid; therefore, the plate must be watched very closely and when the proper strength and snap have been obtained, remove the plate at once and rinse thoroughly and then fix.

38. **Under-Exposure.**— In case the image appears slowly and with contrast, shadows remaining clear, highlights building up slowly, you will readily understand that the plate is under-timed. Then immediately place it in a tray of plain

water, cover the tray and allow the plate to remain in the water for say ten minutes, after which conclude developing in normal developer. We advise covering the tray so as to keep not only the light of your ruby lamp from the plate, but also to prevent the air striking the developer, as this would have a tendency to oxydize and also change the temperature.

39. **Extreme Under-Exposure.**—If the plate shows signs of extreme under-timing, make a new developer weak in pyro,using one-half the quantity of pyro and the regular amount sulphite and carbonate of soda and double the amount of water. In making up a developer with less of the developing agent, you will prevent the highlights from becoming too dense and harsh, and the weak developer will give the shadows an opportunity to gain in strength and detail. Conclude the developing in this bath instead of with normal developer. Your resulting plate will be clear in detail, with no harsh highlights.

40. **Judging When Plate Is Developed.**—The greatest difficulty in developing a plate is to know just when to stop. Conditions have so much to do with the proper developing of a plate that it is hard to state exactly how to tell, under all circumstances, when to stop developing. A properly timed plate is fully developed and carried far enough when the contrast between the highlights and shadows is as you would desire it, and as it appeared on the ground-glass, taking into consideration that the plate loses some of its strength in fixing. Some brands of plates fix out more than others. For instance, a Seed plate will lose two degrees in a hypo bath, while others will lose one shade of density; so when judging if the plate is fully developed, you must bear in mind the brand of plate used and develop accordingly.

41. In considering an over or under-timed plate as to when it is fully developed, you must judge it for the same result as one properly timed, taking into consideration whatever effect the over-timing or irregular conditions may have upon it. Should the plate be slightly over-timed it will thicken (blacken) up more rapidly than if correctly exposed, and, therefore, must be carried farther, by allowing to remain in

the developer until the desired contrast — even in a very dense plate — is visible.

42. If the plate were removed from the developer with an even density throughout, but with no distinction between highlights and shadows, and then fixed, while it may be strong, it will lack the necessary contrast. Such plates must, therefore, be carried to the stage where the contrast between highlights and shadows is visible even in the most dense plate. The plate so developed can then be reduced and a good printing negative made of it.

An over-exposed plate under-developed will appear very thin and full of detail when fixed, but will have no printing quality, so it must be carried far enough to produce this result and stopped there.

43. Upon examining the plate (by looking through it, holding it up to the ruby light) during development, if you are in doubt as to whether the proper density has been obtained, you can, by looking at the back for the image, see how far through the film the developer has penetrated. If in looking through you find the proper contrast and the image also shows fairly clear on the back, you may know your plate is sufficiently developed. Do not depend, however, on looking at the back alone, for in some cases plates will be fully developed before the image appears on the back at all. This greatly depends on the thickness of the emulsion, which varies in different brands and also on the length of exposure.

44. For a plate that is slightly under-timed, necessitating weak, slow development, the image will appear on the back at an early stage and more distinctly than in a normal exposure in which the image may show very dimly or not at all, even when completely developed. You will notice that the highlights show through the film first, and if in looking through the plate the details appear weak, continue development until they are brought out some on the back.

45. **Double Coated Plates.**—The beginner invariably under-develops double coated plates, as the extra emulsion adds to the general density, misleading one's judgment. For these plates the factorial method of development is recommended.

GENERAL NOTES ON DEVELOPERS.

Pyro.— Too much pyro clogs the whites. Too little pyro: slow development, lack of brilliancy.

Alkali.— Too much alkali: quick development, dense, flat negatives. Foggy and granular. Too little alkali: slow development, contrast.

Sulphite.— Too much sulphite: cold, gray tones. Too little sulphite: warmer tones, inclined towards yellow.

Water.— Too much water: thin highlights, plenty of detail but lack of snap and strength. Too little water: more contrast.

Temperature.— Normal, 65° to 70° Fahr. Higher temperature, intensity and likely fog. Lower temperature: flatness, lack of snap.

Drying Negatives.— The warmer and closer the atmosphere in which the negative is dried, the more dense it becomes. Wherever possible, negatives should be dried with an electric fan, or under some breeze. The quicker they dry, within limit, say within a few hours, the finer the grain will be.

NATURE OF CHEMICALS USED FOR DEVELOPING WITH PYROGALLIC ACID.

46. **Sulphite of Soda.**— Transparent crystals, also granular and dried (anhydrous) very soluble in water, two parts of crystal are equivalent to one part dried (anhydrous or granular). Chemical action, neutral or slightly alkaline. Do not confuse sulphite with sulphate of soda.

Carbonate of Soda.— Commonly called washing soda. Transparent crystals, also granular and dried (anhydrous). Very soluble in water, two parts of crystals are equivalent to one part dried (anhydrous or granular). Chemical action, strongly alkaline.

Pyrogallic Acid.— Developing agent. A white crystaline substance, poisonous, although termed an acid its action is neutral.

Sulphuric Acid, C. P.— Chemically pure. A colorless, oily liquid. Commercial sulphuric acid is yellow or brown and should never be used. CAUTION:— Never pour water into sulphuric acid, as this would be most liable to cause an explosion. Always pour the acid into the water. Coming in contact with flesh it will burn. Do not confuse sulphuric acid with sulphurous acid.

Bromide of Potassium.— Colorless crystals, dissolves readily in water.

Hypo-Sulphite of Soda.— Commonly called Hypo. (Thiosulphate of Sodium.) Put up in crystals and granular form, colorless.

Nitric Acid, C. P.— (Chemically pure.) A colorless liquid of a pungent, suffocating odor, is a powerful dissolvent of all metallic bodies, and if coming in contact with the flesh will burn.

47. **Pyro Formula.**— STOCK SOLUTION, No. 1:

Water	24 ounces
Pyro	1 ounce
Sulphuric Acid, C. P.	10 drops

STOCK SOLUTION, No. 2:

Sulphite Soda, Hydrometer Test 70, or, if by weight,	
Sulphite Soda (crystals)	2 ounces
Water	7 ounces

STOCK SOLUTION, No. 3:

Carbonate Soda, Hydrometer Test 40, or, if by weight,	
Carbonate Soda (crystals)	2 ounces
Water	10 ounces

When making up solutions by weight and anhydrous carbonate or sulphite of soda is used one-half the amount is required.

The Stock Solutions of Sulphite and Carbonate of Soda can be made up in any quantity, and they should be kept in a corked bottle.

48. Anhydrous sodas have no water in their composition; therefore, they are twice as strong as the crystal, which has

water in its composition. It is advisable to use anhydrous, or if the crystal is used be sure and get pure crystals. Sodas should be purchased in sealed packages or bottles; never in loose quantities.

49. **To Develop,** take one ounce of No. 1, one ounce of No. 2, one ounce of No. 3, and add six ounces of pure water in cold, and eight ounces in warm season. The action of the developing agent (pyro) is more rapid in warm than in cold weather. In warm weather the emulsion softens more readily, and the action of the pyro is more rapid; therefore, if the same strength developer was used in warm as in cold weather the negatives would thicken up too rapidly, resulting in harsh, strong negatives. This is overcome by adding more water to the developer. In cold weather the emulsion remains firmer, and the pyro does not affect it so readily; therefore, it is necessary to use a stronger developer — consequently less water is used than in warm weather.

Developer should never be used but once, whether one plate or a batch of plates are developed in a tray. After a plate or a tray full of plates have been developed, that developer should be discarded, or poured into the second tray to be used as a restraining bath. All normally exposed plates should be started developing in a fresh bath.

In preparing a pyro stock solution, first place the water in the graduate, then add the sulphuric acid, and last add the pyro. If the water used is strongly alkali, and the chemicals were not mixed in the order given, this stock solution would discolor very rapidly.

50. **Proper Color of Plate.**— If the plate when fixed is too yellow, strengthen the sulphite; if there is a lack of color, the negative is a blue-gray, reduce the strength of the sulphite stock solution, but use the same quantity. The proper color of a plate is of the gray order, with the least tinge of brown.

51. **Chemical Action.**— Always bear in mind that sulphite of soda regulates the color-value in the plate; carbonate of soda produces detail; and pyro being the developing agent, gives strength and contrast. If the plates are yellow

you will understand that the sulphite is not strong enough. For example, we will say you are using sulphite at seventy test, and your plates are quite yellow. Strengthen it to perhaps eighty hydrometer test, all other chemicals remaining as they are. Regulate the color of the plate entirely by the strength of the sulphite of soda.

52. You will find it rarely, if ever, necessary to change the strength of the carbonate of soda. If, however, you find upon testing the water that it is strongly alkaline, you may find it necessary to change the strength of the Carbonate Stock Solution, that is, make it weaker. For if the water you are using is strongly alkaline instead of being neutral, and the regular amount or strength of alkaline solution (carbonate of soda) was used, you would have more alkali than necessary to balance the developer. If there is too much carbonate (or alkali), you will find the emulsion of the plate will be rather grainy. In such a case reduce the strength of the carbonate of soda very slightly, say five degrees, and this effect will be overcome. The pyro is used for strength. If the plate develops contrasty, use less of No. 1 (Pyro Stock Solution), but usually the formula given will need no altering whatever.

53. **Use of Hydrometer.**— A hydrometer is an instrument for determining the specific gravity of liquids. The strength of the liquid is determined by the depth to which the hydrometer sinks in the solution. It has on it a series of numbers from ten to eighty. When testing the strength of solution correction must be made for variations in temperature. If the liquid is cold it may allow the hydrometer to sink lower and the strength it would register might appear weaker than it is; if warm, it would be just the reverse. Do not prepare chemicals by weight; use the hydrometer for testing them and you will always have uniform results.

54. If chemicals in crystal form should dry to a powder by exposure to air, the weight would be altered, although the strength of the original quantity would remain the same; consequently a solution made by dissolving one ounce of the dry

powder would be stronger than one ounce of crystals in the same quantity of water. Also chemicals of different brands, and even of the same brand but procured at different times, are seldom of uniform strength, and if prepared by weight instead of by hydrometer test, you will be apt to meet with frequent failures.

55. **Alteration of Formula for Different Brands of Plates.**— The formula for developing given herein will work well with any brand of plate by following the above directions. If you are using a brand of plate that will strengthen quickly use more water. If, on the contrary, you cannot get the desired strength, reduce the amount of water, thus making your developer stronger and the developing agent (pyro) will act more rapidly.

56. For Seed, Standard and Stanley Plates use according to formula; for Cramer (more pyro should be used) ten drams of the Pyro Stock Solution No. 1 and nine ounces of water; but for Hammer Plates (use less pyro) only six drams of Pyro Stock Solution No. 1 and eight ounces of water. Sodas remaining the same for all brands of plates.

57. **Fixing Bath.**— For fixing bath use plain hypo and water, one pound of hypo to two quarts of water, or testing sixty by hydrometer, and during hot weather keep the bath cool. Allow the plates to remain in this bath about twenty minutes, or about ten minutes after all whiteness (bromide of silver) has disappeared. Should plates show a tendency to frill in hot weather, prepare a hardening bath composed of one-half ounce of ground alum to one pint of water. Immediately after fixing, rinse the plates well and then immerse them in this hardening bath for one minute, or until the film becomes hardened, and transfer them to the washing box. The hypo bath will discolor after using a few times, but this need not alarm you, as the hypo bath is good as long as it will fix plates in a reasonable length of time, say fifteen minutes, and not stain them. Always rinse your plates carefully before placing them in the hypo; otherwise you will be carrying the developer into the hypo, and this is what causes the discoloration.

58. We advise the use of the best sodas. Do not buy the commercial goods. Pure crystals, or anhydrous sodas are the best.

59. **Weights and Measures.**— When not using the hydrometer in making up your solutions, the Apothecaries' Weight and measures should be used.

APOTHECARIES' WEIGHT.

20 grains — one scruple	20 grains
3 scruples — one dram	60 grains
8 drams — one ounce	480 grains
12 ounces — one pound	5760 grains

FLUID MEASURE.

60 minims	one fluid dram
8 drams	one fluid ounce
16 ounces	one pint
8 pints	one gallon

60. **Preserving the Pyro.**— The Pyro Stock Solution should be kept in a tightly corked bottle, using a glass stopper (if possible, a brown or yellow bottle preferred). If a plain glass bottle is used, wrap it with dark paper, and place in a dark, cool place in your dark room. It should be shaken each day to keep the sulphuric acid thoroughly mixed with the pyro and water.

61. The formula given herein for developing can be adjusted to any class of exposure. By diluting with water for under-exposure, and by carrying farther in the normal developer for over-exposure, you have control of the plate under all reasonable conditions.

CHAPTER III.

DIFFICULTIES—DRY PLATE DEVELOPING.

62. **Plate Slow in Starting to Develop.**— This difficulty you can overcome by being careful that your developer is not too cold. The temperature should never be under sixty nor above seventy degrees Fahr. Insufficient carbonate of soda or too weak carbonate and poor quality of soda will slow the development. Prepare your sodas by hydrometer test. Always bear in mind that the carbonate of soda opens the pores of the emulsion on the plate and allows the developing agent (pyro) to act; therefore, if there is no carbonate of soda, or if it is extremely weak or of poor quality, the plate would develop very slowly. If the plate refuses to develop at all, you will find you have omitted either the Carbonate or Pyro Stock Solution. If the plate is extremely under-timed it will naturally start slowly. (See Chapter IV, DEVELOPING UNDER-EXPOSURES.) Slow developing is not a bad fault, however, as it is better to have your plate start gradually than to have it start fast. Starting slowly will enable you to better judge whether your plate is under or over-exposed, and the slow action of the developer will enable you to treat the plate before it gets beyond your control.

63. **Lack of Detail in Shadows.**— If you develop your plate according to its exposure you will be able to overcome this difficulty, providing of course, that the plate is not too badly under or over-exposed. If your plate is under-exposed and you treat it as such, you will produce more detail than if you developed it in the ordinary way; but of course if badly under-exposed you will not be able to get a great deal of detail in the shadows, no matter how you alter the developer. In case of an under-exposure, the first thing to consider is how to prevent the highlights becoming harsh and contrasty, and at the same time producing detail in the shadows. The developing agent (pyro) must, therefore, be weakened. In case of an ordinary under-exposure, simply transferring the plate into fresh water for ten minutes and then returning it to the normal developer will generally produce detail in the shadows.

On the other hand, if the plate is badly under-exposed a new developer should be prepared at once, and this must then be made according to your instructions on DEVELOPING UNDER-EXPOSURES, Chapter IV, using only half the quantity of developing agent (pyro), but the same amount of sodas and double the quantity of water. If the plate is over-exposed you would naturally think there would be plenty of detail in the shadows. The exposure has provided this detail, but in over-exposing a chemical fog is produced, and if the plate is not treated as over-exposed you will produce gray, weak, foggy shadows and there will be no strength to the detail. A plate of this kind must, therefore, be developed in a developer which contains a restrainer. Ordinarily, by transferring a plate from the normal developer to the developer in which plates had previously been developed, will restrain the shadows and prevent them from fogging over; but in case of extreme over-exposure the plate must be specially treated with bromide. (See Chapter VII, DEVELOPING OVER-EXPOSURES.) In the instructions for developing you are told that old developer contains bromide which has been liberated from the plates which you previously developed; therefore, this old developer makes a splendid restrainer.

64. **Properly Exposed Plates Developing Slowly.**—As already stated, the first consideration in developing is the temperature of your developer. If the developer is cold the plate will develop slowly and thin. If the developer is diluted too much it will develop very slowly. If your carbonate of soda is of poor quality, or if you have not the proper strength called for, the plate will develop slowly. You must, therefore, be careful in preparing your developer. See that your sodas are of good quality. The anhydrous or pure crystals should be used. Always buy the same brand either in bottles or in sealed packages. Another important factor is the temperature of your dark room. If it is extremely cold the action of the developer will be very slow.

65. **Plate Flashing Up Quickly and Darkening All Over at Once, Detail Very Dim.**—When a plate acts like this it is a certain sign that it is over-exposed, or the entire plate has been fogged (light struck) before or after exposure.

66. **Judging if Plate Is Under-Timed.**—If a plate is under-timed you will have trouble in getting it started in developing. When it finally does start, the highlights will build up contrasty, but very slowly, and the shadows will remain clear. In case of extreme under-exposure the shadows will be almost clear glass. There will be little or no detail.

67. **Judging if Plate Is Over-Timed.**—If a plate is over-timed the action of the developing will be very fast. The highlights will develop rapidly, but will be closely followed by the shadows. The shadows will fill with detail, then the entire plate will appear to fog over as it were, and instead of gaining in strength will grow dim.

68. **Producing Proper Contrast.**—You can only get proper contrast by being careful and developing the plates according to their ex-

posure. If over-exposed, treat it as such or you will produce weak, flat negatives. If under-exposed and you do not treat it as such, you will produce negatives with too much contrast, strong highlights and no detail in the shadows.

69. **Proper Color.**— The proper color of the negative should be on the gray order with just a tinge of brown. With the proper exposure and developer prepared according to the instructions, this is the color you will produce. If the plate is over-exposed, necessitating prolonged development, the plate will become stained a slight yellow, which, however, is not objectionable, as it will add strength to the printing quality. A thin, yellow negative will give a stronger print than one which is a blue-gray, for if a plate is extremely gray, or blue-gray, it will produce prints with weak shadows and highlights; a very pretty negative to look at, but one that will not give a snappy, brilliant print. The printing from such a negative will be very quick, so quick that the surface of the print only is affected, and when the print is washed the strength is washed away, resulting in a weak, mealy picture.

70. **Judging Proper Strength.**— It is impossible to give any method by which one could judge absolutely the proper strength of development under all conditions. Only practice and close observation can teach you this. The difference in exposure, the lighting, etc., all have some bearing on the strength to which one should carry the development. One rule can be followed, however, and that is when the distinction between the highlights and shadows is as it appeared on the ground-glass, making due allowance for the fixing, then the plate is fully developed. There are many ways of judging density. A very convenient one is to hold the plate before the ruby light and place one finger close to the film and near the strongest highlight, and when you find the highest light is as dense as the finger, you can consider the plate of the proper strength. It is a good practice in developing, when in your judgment the plate is developed far enough, to try and impress upon your memory the density of the plate developed, and, after fixing, examine the plate in daylight by looking through it. If it is too dense or too thin, you must govern yourself accordingly in developing the next plate. With this practice you will soon be able to judge the proper strength of development under all conditions.

71. **Judging When Plate Is Fixed.**— A plate is generally considered fixed when all the white or creamy effect has disappeared from the back of the plate, but even then, it is safe to allow your plate to remain in the fixing bath ten minutes longer. A plate may appear fixed and yet not be thoroughly fixed. If your fixing bath is cool and not too old, you could allow your plate to remain in it for hours and the hypo would do no harm. There is practically no danger of over-fixing; however, if the hypo bath is old and warm it would be apt to reduce the plate and soften up the emulsion so badly that the image on the plate would

be destroyed, or the emulsion would slide off entirely; therefore, it is advisable to renew your hypo bath often.

72. **Discolored Hypo Bath.**— This need not alarm you, as the hypo bath is good as long as it will fix the plate in a reasonable length of time, say twenty minutes, and not stain. Always rinse your plate (both sides) before placing in the hypo; otherwise you will be carrying the developer into the hypo, and this, with the silver in the plate, will cause the discoloration of both plate and hypo.

73. **Mottled Negatives.**— Generally caused by allowing the plate to remain in the developer without agitating. This is more frequently caused in extremely slow development; as for instance, when you are using old developer. *Remedy:* Obvious.

74. **Finger Marks.**— Caused by carelessness in handling plate before developing. *Remedy:* Never allow the fingers to come in contact with the film side of the plate.

75. **Frilling.**— Caused by warm solutions, warm hypo, or warm wash waters. *Remedy:* Keep all solutions and wash waters cool. (See paragraph 57.) Dry your negatives in a cool, well ventilated room so that they will dry as quickly as possible. Dry the negatives at an open window, being careful that the sun does not strike the same. Dry with electric fan when possible.

76. **Uneven Development.**— Caused by not covering the entire plate when first pouring on the developer. Parts of the plate that do not come in contact with the developer will develop slower, and no matter how long you develop it will show uneven developing. Insufficient amount of solution will also cause uneven development.

77. **Blisters.**— Caused by warm wash waters, warm developer, warm hypo and washing too long. *Remedy:* Keep your solutions and wash waters cool, and do not wash longer than one-half hour in running water. You must also be careful and see that your carbonate of soda is not too strong. If stronger than the formula calls for, the film will soften very readily and you are apt to obtain blisters.

78. **Pin Holes and Spots.**— These are produced in so many different ways that it is impossible to enumerate and describe all of them. The best way to prevent them is to observe cleanliness in all operations. Your dark room, graduates, measures and trays which contain developing solutions should be kept clean. Your camera and plate holder dusted occasionally. The fixing solution should be filtered to free it from any sediment, and each plate must be carefully dusted before placing in the holder and before placing in the developer. The most common spots are small, round, or nearly transparent, with dark defined edges. These are caused by air-bubbles adhering to the surface of the plate when the developing solution is first flowed over it. The gelatine being hard and the bubbles preventing the alkalies from taking hold of the emulsion at once, is apt to leave these little air-bells. These bubbles can be removed by gently passing a tuft of absorbent cotton,

"WOODLAND MIST"

Wm. T. Knox, New York City

Study No. 2, See Page 389

thoroughly saturated with developer, over the surface of the plate immediately after it is immersed in the developer.

79. **Round Transparent Spots.**—May be caused by a drop of bromide solution, or a drop of hypo solution falling on the plate either before the developer is flowed over or even during development. *Remedy:* Never add bromide to the developer while the plate is in the tray; either remove the plate from the tray and then add the bromide (mixing well), or pour your developer into a graduate and add the few drops of bromide in the graduate and then pour the developer back over the plate. Wash the hands carefully after being in hypo, thus avoid carrying any of the solution into the developer.

80. **Small Transparent Spots, Triangular in Shape and Irregular in Size.**—These are caused by particles of dust adhering to the gelatine surface of the plate at the time of exposure in the camera, or by dirt in your developer or hypo. *Remedy:* Filter all solutions, dust the camera and plate-holder and plate, and no spots of this kind will appear.

81. **Large Transparent Spots, Triangular in Form and Irregular in Size.**—These are generally caused by a scum which forms on the surface of old developer, and sometimes on new developer, if after it has been mixed it is left exposed for some time before using, in the developing tray, or an open vessel, such as a graduate. When the developer is then distributed this scum breaks up into small triangular particles, and it adheres to the surface of the plate, thus preventing the action of the developing solution. *Remedy:* Filter such developers immediately before using.

82. **Small Transparent Spots Resembling Little Particles of Lint and Dust.**—These are usually caused by brushing the surface of the plate hurriedly before placing in the holder. The gelatine film becomes electrified by the friction and attracts the dust and lint floating in the surrounding atmosphere. *Remedy:* Always dust carefully and slowly; do not press on with your brush too hard; dust only in one direction.

83. **Purple or Dark Opaque Spots, Regular in Size but Comet or Irregular in Shape.**—These are generally caused by small particles of dry pyro coming in contact with the plate either before or during development, or by adding dry pyrogallic acid to the developing solution just before or while developing. These little particles of undissolved pyro when coming in contact with the plate will cause opaque spots. *Remedy:* Never add dry pyro to your developer. Never weigh your pyro in your developing room, especially just before developing. Sediment in your hypo bath often causes opaque spots. Iron or rust in the water used will cause opaque spots. *Remedy:* Make a new bath. If the water contains iron or rust, the pyro attacks the rust and is immediately coated with it, and when this touches the film it will leave an opaque spot. *Remedy:* Filter water through two thicknesses of muslin, tying the muslin over the tap. These spots at times can be

removed by soaking the plate in water to which has been added a few drops of nitric acid, being careful not to use too much acid.

84. **Yellow Negatives.**— Negatives will some times turn yellow in the final washing. This is attributable to the water. If the yellow is produced by weak or decomposed sulphite, or decomposed pyro, it will show just as soon as the plate is fixed. In either case the negatives should be immersed in a clearing bath. (For formula, see Chapter X, on NEGATIVE REDUCING.)

85. **Thin Negatives.**— Thin negatives with transparent shadows are due to under-exposure and can seldom be improved by intensifying. (See Chapter IV, DEVELOPING UNDER-EXPOSURES). Thin negatives with foggy detail in shadows are usually the result of over-exposure. The negatives will be thin in the highlights and will make very unsatisfactory prints. Diluting developer with too much water will produce thin negatives. Under-developing will do the same. The results produced by these different causes are not the same, but the difference is very slight, so slight that it is not easily described. Negatives of this kind can be improved by intensifying. (See Chapter V, INTENSIFYING.)

86. **Dense Negatives.**— Such negatives are generally obtained by over-developing, allowing the plate to remain in the developer too long. *Remedy:* Soak in hypo for twenty minutes and then reduce. (See Chapter X, on NEGATIVE REDUCING.)

87. **Parallel Lines on Negatives.**— These are generally caused by too strong a fixing bath and bath not thoroughly stirred before using. These lines, however, generally occur when plates are fixed in a grooved box.

88. **Part of Plate Stained Yellow.**— Caused by plate not being entirely covered by the hypo.

89. **Spots and Streaks Almost Transparent on Plates after Drying.**— Caused by water spattering on the plate when dry, or nearly dry.

90. **Granular Negatives, Film Having a Grainy Appearance.**— Caused by using too much or too strong a solution of carbonate of soda. Rocking tray violently while developing. Extremely slow drying of plate.

91. **Negative Drying too Slowly.**— Caused by drying plates in too warm, too cold, very damp, or poorly ventilated room.

92. **Negatives Evenly Developed but Drying Unevenly.**— If the negatives when partly dry are removed to another room which is much colder, or warmer, or if parts not dry are forced dry by fanning, they will dry unevenly. The part last dried will be more dense than the first part.

93. **Negatives Full of Dirt and Scum when Dry.**— Caused by dirt in wash water. *Remedy:* Before placing the negatives in the rack to dry, wipe carefully with a tuft of absorbent cotton thoroughly saturated with water. Clean your washing box every day.

94. **Yellow Negatives, Even with Sodas of Proper Strength.**—Sometimes sulphite of soda when in solution, even though it tests the proper strength, loses its life by age and becomes worthless; that is, it does not have its color preserving quality. An indication of this would be if the plates were yellow and grainy; in such cases make up fresh sulphite. It is best to not use sulphite solution over a week or two weeks old; better make up a smaller quantity and renew more often.

CHAPTER IV.

DEVELOPING UNDER-EXPOSURES.

95. It is not the object of this instruction to encourage the under-timing of plates, but to provide the student with a means of treating plates which he finds, upon development, are under-timed. In order to produce the very best results from plates so exposed, they should be treated according to these instructions.

96. Upon reading the title of the instruction, the first question that is likely to arise in the reader's mind is how he is to know before development that the plate is under-exposed, and if he does know, why does he under-expose. Under ordinary circumstances one should aim to fully time all plates. However, there are occasions when one may find it necessary to slightly under-expose a plate in order to produce certain results which could not be obtained were you to give the plate a longer exposure. This is the case more frequently in landscape photography. It will sometimes occur, however, in making portraits; also when children, especially babies, are being photographed, and more frequently when using black backgrounds.

97. In landscape work, for instance, you may be attracted to a pretty view full of deep shadows and strong highlights, which make it impossible to expose for the detail in the shadows and not over-time the highlights. While you can overcome this by cutting the exposure in half, still the plate is under-timed in the deepest shadows and you will have to rely on the developing to overcome this and make a good negative, full of detail and with good half-tones.

98. There are also scenes which the inexperienced worker would consider absolutely impossible to photograph, owing to their peculiar surroundings, and it is just these circumstances that attract the eye and make such a view interesting. The most picturesque scenes are generally the most difficult to reproduce photographically. We will imagine, for instance, a small brook, or a creek, located in some deep ravine, with willows and brush overhanging the greater portion of the water, perhaps with large trees on either side. A stone or rustic culvert crosses the stream, and when the sun's rays fall upon the ripples of water as they roll over the little pebbles and rocks in the brook, they sparkle like diamonds. If one could reproduce, photographically, this creation of Nature the highest attainment of art-photography, as applied to landscape, would be reached. The picture is there; the secret lies in the excellence of the view point and the scientific manipulation of the plate during development. For such a *picture*, we must first decide upon the best view point from which to make it. Raise or lower the camera to retain the effect of the ripples in the stream. The most rapid plates must be used, and the speed of the shutter must be equal to the motion produced by the running water.

99. In the majority of cases a speed of $\frac{1}{25}$ second will be rapid enough, using an open lens. It is advisable to use an open lens, for a small opening would necessitate longer exposure, and stopping down also accents the shadows, makes them deeper and sharper. The aim, therefore, must be to admit of as long exposure as possible, and yet retain the principal point in the view, which in this case is the ripples. The edge of the brook over-shadowed with willows and shrubbery will be quite dark, and to secure detail in this portion of the view would ordinarily require perhaps a full second exposure.

100. The principal point of view in this picture (the running water) cannot be photographed with a time exposure. We must, therefore, make such an exposure as will produce the effect desired in this portion of the picture. As mentioned above, this will require a speed of about $\frac{1}{25}$ second with an open lens, to produce the desired effect. It is need-

less to state that such a view should be made at a time of day when the light is the very strongest in the shadows, for the illumination is weak underneath the willows and shrubbery even when the light is strongest. The sunlight which shines through the leaves is very small in quantity as compared with an open light, and it is simply a matter of utilizing this quantity of light to the best advantage.

101. **Under-Timing Portraiture.**—In portraiture the only real necessity for under-timing a plate is when photographing children, especially babies. Many times a very natural, pretty pose and cute expression of a child may be obtained if the exposure is made quickly, thereby slightly under-timing the plate. There are also times when you are apt to slightly under-time a plate, and not know it. The very best operators are likely to misjudge photographic color values and slightly under-time their regular work. Such plates must be treated and developed entirely different from properly exposed plates and the developing chemicals must be so manipulated as to give you the best results under the circumstances.

102. **Action of Carbonate of Soda.**—You may be led to believe, because carbonate of soda is termed the detail producing chemical, and is used in developing to open the pores of the film, and permit the pyro (or whatever developing agent you are using) to build up the detail, that you can under-expose to any extent you please, and the carbonate, if used in sufficient quantities, will supply all detail required. *Such is not the case.* No chemical will supply detail where there has not been sufficient exposure to produce it. However, by the proper manipulation during development you can obtain all the detail that the exposure has produced, but such exposures cannot be developed with normal developer. They must be specially treated as under-timed plates. To develop in the ordinary way with a normal developer would give very unsatisfactory results — strong highlights, deep shadows and no detail. By altering the developer according to the methods given in this instruction, you can retain every value that is possible from such exposures, and many times

save a plate, which if developed ordinarily would be worthless.

103. **Developing.**—We will first consider the developing of a plate in which you are certain the deepest shadows are under-exposed. We will suppose that the subject is a landscape study such as we have described. Having made the exposures, now follow the developing of the plate so as to produce the best results. The plate without question is considerably under-timed in the most dense shadows, for the shadow portion of the plate had so little illumination that the exposure given has hardly produced what little detail was visible to the eye. Therefore, it is necessary to open the pores of the film so that the required chemicals may be given every advantage to act.

104. **Chemical Action.**—Remember the effects of the different chemicals used when making up the developer. Pyro being your developing agent; carbonate of soda detail producing agent which opens the pores of the film so that the developing agent can act, thereby supplying detail; and sulphite of soda controls the color. Carbonate of soda alone is a strong alkali, and when used in connection with pyro without any color preserving chemical would give very harsh results and a yellow negative. Therefore, carbonate of soda must be combined with a color preserving chemical in order to retain control of the color of the plate.

105. In an under-exposure it is necessary to open the pores of the film as much as possible before admitting the developing agent (pyro) to act; therefore, place the plate in a very weak accelerating solution composed of carbonate and sulphite of soda, using them at the proportionate strength given in the formula for ordinary developing. Sulphite of soda, hydrometer test 70; carbonate of soda, hydrometer test, 40. Take of these stock solutions one ounce of carbonate, and one ounce of sulphite of soda, add sixteen ounces of water. Soak the plate in this solution, covering the tray so as to exclude all light and air. Allow the plate to remain in the solution for ten minutes, rocking it occasionally so that the accelerator will act evenly. While the plate is soaking prepare the de-

veloper as follows: (Regular formula for stock solutions will be found in Chapter II, DRY PLATE DEVELOPING).— Of the stock solutions take,

Pyro.....1 dram.
Carbonate of Soda (40 hydrometer test).....1 oz.
Sulphite of Soda (70 hydrometer test).....1 oz.

106. Add twenty ounces of water, and pour this developer in a tray. Place the plate in this tray, covering it to exclude all light and air, being careful that the plate is entirely covered with the solution, and occasionally rocking the tray to avoid streaks. Allow it to remain fifteen minutes, when upon examination you will find the plate has developed slowly, but not hard. Should the plate not be fully developed, prepare a new developer exactly like that in which the plates are developing, and proceed the same as before. Repeat this operation, renewing the developer every fifteen minutes until the plate is completely developed.

107. **Tank Development.**—Another very good way is to use tank development. This method requires a larger quantity of solution, but several plates may be developed in this tank at one time. Provide a deep galvanized iron, or better still, a deep rubber grooved box, a regular hypo fixing box — a new one of course — one that has not been used for any other purpose. Fill this tank half full with developer, then add water to within one inch of the top, and stir well. Then place the plate, or plates, in this tank, covering it to exclude all light, and allow plates to remain half-hour, when they should be completely developed. If, upon examination, they are not strong enough, allow them to remain in the tank until fully developed. Owing to the large bulk of solution the tank developer will last for hours without renewing. See Volume I, Chapter XII.

108. **Action of the Pyro.**—The very small quantity of pyro used in developing under-exposed plates gives the accelerator an even opportunity to thoroughly open the pores of the film. The highlights having been fully timed, or possibly a trifle over-exposed, will naturally develop soft on account of the small quantity of pyro used. If the regular

amount of pyro had been used in long development, these highlights would clog and become very dense. Having, however, used only a small quantity of pyro, this will allow for extremely slow development. Consequently, the plate, instead of developing hard and contrasty, will be clear in the shadows, soft in the highlights, and full of half-tones.

109. **Developing of Doubtful Exposures Which Prove to be Considerably Under-Exposed.**— Such plates should be started in normal developer, and as soon as the highlights appear, if you observe the shadows are holding back, with practically no detail, and the highlights are building up slowly but very strong, it is a certain indication that the plate is under-timed; so at once place the plate in a tray of plain water. Owing to the fact that the plates are partially developed they cannot be placed in the accelerator bath, as given in paragraph 105, for the accelerator alone after the developing agent has once been applied would be liable to cause a chemical fog — therefore the safest treatment is a plain water bath. Allow the plate to remain in the water for ten or fifteen minutes, covering the tray so as to exclude all light and air. While the plate is in the water prepare a new developer, weak in pyro. Take two drams of your pyro stock solution, add one ounce of sulphite of soda solution (hydrometer test 70), and one ounce of carbonate of soda solution (hydrometer test 40), and then add sixteen ounces of water. Remove the plate from the water, and complete the development in this bath.

110. If the shadows fail to come up and still lack detail, it is well to gently press the ball of the hand, or the tips of the fingers, on the portions that will not develop, permitting the heat from the hand to warm that part of the plate, thereby assisting in developing more rapidly. Breathing on these parts of the plate will also have the same effect.

111. **Developing Normal or Slightly Under-Timed Plates.**— Place your plate in normal developer. Just as soon as the highlights begin to appear, carefully examine the plate by holding it before the ruby lamp, and if you find that the shadows are developing slowly, with little or no detail

showing in them, the highlights building up contrasty but slowly, you will at once know that the plate is a trifle under-exposed. Transfer it to a tray of fresh water, and allow it to remain for ten or fifteen minutes. You will be surprised to see how much detail the plate will develop in plain water after it has been transferred from a developer, in which it has been developing for a short time. Allow the plate to remain in the plain water for a few minutes, and when you find that sufficient detail has been produced in the shadows, return it to the normal developer. If the plate was over-exposed instead of under-exposed, and should you leave it in the plain water too long, you would produce a flat negative, often times producing fog in the shadows. It is, therefore, necessary to closely watch the plate at all stages, whether in the water or developer, and be certain the plate is either under or over-exposed before you attempt to alter the developer.

112. We would advise in ordinary developing of white drapery, where there is red or black hair to contend with, that you remove the plate from the developer as soon as the image appears, and hold the plate under the tap, permitting the water to fall on the hair, or portions you desire to develop more quickly. A few moments of such treatment helps the general result considerably.

113. To produce softness in the white drapery itself, place the plate under the tap just as soon as the image first appears, allowing the water to fall on the portions which do not develop freely. This will many times improve the negative.

114. Of course a great deal depends upon the temperature of the water you are using, also the temperature of the developer. When developing under-exposures the water should never be colder than 65° to 70° Fahrenheit. In winter months the chill should be taken off the water for all exposures, whether under-timed or fully timed, and should be kept at about the same temperature as in the summer months. In cases of developing under-exposures, it is advisable to have the developer never below seventy in winter, and sixty-five in summer. Do not attempt to develop under-exposures in cold, dark rooms. Try to have the temperature of the dark room

at least sixty degrees. If the dark room is cold the developer soon becomes chilled, and the action is much slower and will retard the development of the deepest shadows.

115. In case of warm climates or extremely warm weather, when the developer being warm is liable to cause the film to soften and perhaps frill, it is advisable to use an acid hardening hypo bath, prepared as follows:

116. **Acid Fixing Bath :—**

(*A*)	Water	100 ounces
	Hypo	2 pounds
	Sulphite Soda (granular)	2 ounces
(*B*)	Water	32 ounces
	Chrome Alum	2 ounces
	Sulphuric Acid—C. P.	2 drams

If by Hydrometer test	(*A*)	Hypo test 80°	100 ounces
		Sulphite Soda Sol. test 60°	16 ounces
If by Hydrometer test	(*B*)	Chrome Alum test 20°	32 ounces
		Sulphuric Acid C. P.	2 drams

117. After the ingredients are thoroughly dissolved, pour *B* into *A* slowly, while stirring *A* rapidly. This bath remains clear and fixes clean, after long continued use, but should be replaced as soon as the fixing becomes slow, as the bath is then exhausted. Allow the negatives to remain in the fixing bath at least five minutes after the whiteness has disappeared. The longer the plates remain in the fixing bath the less washing will be required, and with the acid bath the film also becomes harder, and fifteen to twenty minutes washing is sufficient.

118. A smaller portion of the bath can be made up if one so desires, but as the larger bulk keeps better, and if one has considerable developing to do, it is better to make up the full amount. If only an occasional plate is to be developed each day, then one-fourth the formula is sufficient, or one may purchase the regular acid hypo put up in small packages, making sixteen and twenty-four ounce solutions. These stock acid hypo solutions can be obtained from any supply house.

119. **Practice Work.** — It is advisable to purposely under-time a few experimental plates under different conditions. The different methods suggested for the treatment of plates under-exposed should be tried one method at a time. The negatives of first experiments should be dried, and good solid proof prints made; the necessary data should be noted on back of proofs, including date, and stating whether first, second or third experiment. These proofs should then be filed for future reference, and further experiments made according to instructions, always being guided, of course, by results of former experiments. It will not require many tests of this kind before one becomes familiar with the appearance of plates in the developer of all exposures, and can judge instantly how much nursing they require to produce good negatives, and by instinct apply the proper method.

DIFFICULTIES — DEVELOPING UNDER-EXPOSURES.

120. **Negative Drying with too Much Grain.** — This is apt to happen with plates that have developed slowly. Long, continuous soaking will soften the film, and cause it to raise from the plate, and when it dries it will dry with a grain to the film. Another cause is due to previous soaking in the carbonate and sulphite bath. This opens the pores to an excess. Plates treated thus should be washed in running water for no longer than fifteen minutes and dried quickly either by an electric fan or in a room where there is plenty of air circulating. A good plan is to dry them at an open window, as this will give a free circulation of air, but you must be careful that the sun does not shine on the negative while drying, as the heat of the sun is apt to dissolve the film.

121. **Yellow Negatives.** — Long soaking in the water; soaking in the accelerator with insufficient sulphite; poor carbonate or poor sulphite and prolonged development are apt to cause this yellowness. When the pores of the film have been opened to an extreme the pyro is

apt to stain. As a general thing in an under-timed plate this yellow tint, if only slight, will do no harm, but rather adds strength to the printing quality. You can remove this yellow by treating with clearing solution, given in the instruction on NEGATIVE REDUCING, Chapter X.

122. **Plate Developing Only Partly and Then Stopping.**— When the plates are badly under-exposed they will generally act in this manner. By adding a little more carbonate of soda, being careful, however, not to go to an extreme, the plate will continue to develop. When you find that the shadows are beginning to fog it is advisable not to attempt to develop any further, simply rinse and fix the plate. Applying a fresh developer diluted with four times the amount of water and allowing the plate to remain in this bath for fifteen to twenty minutes will bring out all the details possible to obtain with the exposure given.

123. **Shadows Lacking Detail.**—If the plate is very much under-exposed the shadows will lack detail, no matter how you treat them in the developer. You can improve them to some extent, however, by either breathing on these shadows during development — holding the negative close to the mouth — or laying the fingers on the shadows. This warmth of the breath or fingers will assist the developer in acting. You must be careful, however, not to lay the ball of the finger on too heavily, or it will injure the film. You can improve them considerable by the treatment given in paragraph 122.

124. **Plate Frilling.**— If the developer becomes too warm, which might be the case in a very warm, dark room, or from the continued placing of the warm fingers in the developer, the plate is apt to frill. The excessive use of strong alkali (carbonate of soda), is apt to make the plate soft and frill. Under-timed plates, or plates which develop slowly, should be handled as little as possible, for the long soaking of the film causes it to soften and is, therefore, very easily damaged. See that your hypo is fresh and cold. After the plate has been fixed, rinse for a few moments, and place in a weak alum solution — decant half an ounce saturated solution of alum in ten ounces of water. This will harden the plate and overcome any frilling. Be sure and use only the decanted solution, for alum crystals coming in contact with the film will produce a purple stain. After hardening, wash thoroughly before setting to dry.

125. **Little Blisters Forming on Plate.**— Blisters on the plate should be treated exactly as you would a frilling plate. These little blisters come from the same source that causes the plate to frill, and if placed in the alum hardening bath immediately after fixing, the blisters will be avoided. Should the blisters appear during fixing in the hypo, then use an acid-fixing bath.

126. **Negatives Fogging During Development.**— Extremely weak developer and excessively long development under the ruby light is apt to fog the plate; also an excessive use of carbonate and sulphite. To

overcome this difficulty extreme care must be exercised in regard to the ruby light, for by long development even the ruby light is apt to fog the plate. You must also be careful and prevent the air from affecting the developer, which deteriorates, and causes oxydization very rapidly. A good plan is to have a cover for the tray, being careful, however, to rock the tray occasionally during development.

127. **Negative Flat.**— This is generally caused by misjudging the plate in regard to exposure. If, for example, your plate was only slightly under-exposed there would be no strength to the highlights, and the result would be a flat plate. If you find the plate does not gain strength in the highlights, and appears flat, place the plate in normal developer. You may even find it necessary to add a little more of the developing agent (pyro). Over-exposures and under-development will also produce flat negatives. Such plates can be improved by intensifying. (See Chapter V, on INTENSIFYING.)

128. **Negatives Lack Strength and Snap.**— When you find that the plate refuses to build up any stronger in a weak developer, transfer it to the normal developer for a minute or two, or until you have produced the proper strength in the highlights.

MORNING LIGHTS AND SHADOWS

Study No. 3, See Page 389

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CHAPTER V.

GENERAL NEGATIVE INTENSIFYING.

129. The object of intensifying is to rectify the misjudgment of exposure and development.

Many times very weak negatives are condemned on account of their poor printing quality, they being thin, and printing flat, caused by insufficient developing, under-exposure, or other causes. Many dark room men judge their negatives by brilliancy, regardless of their printing quality. The most beautiful appearing negatives do not always yield the best prints. On the contrary, some apparently poor negatives have the qualities which are essential in producing the finest prints.

130. A thin negative, if stained brown or yellow, will have better printing quality than one which is blue; therefore, a tinge of brown color is the best. Always judge your negative for printing qualities alone. There are times when, through misjudgment, a plate is not developed far enough, being removed from the developer too soon, resulting in a thin negative with little contrast between the highlights and the shadows.

131. Generally, in landscape negatives of this kind, the sky portion being thin will print gray, and the shadows will be weak. In portraiture the highlights would be flat. Such negatives may have the proper color (brownish tint), which would be to their advantage, yet they lack the snap necessary to produce strong brilliant prints where all the proper shades from the highest lights to the deepest shadows will appear as the eye sees them, with good detail. The remedy for

such a negative is to intensify it, thereby strengthening the highlights and shadows.

132. In many cases this treatment of the negative improves its printing quality so much that one not knowing how the negative had been treated would declare that the prints made before and after intensifying were not from the same plate. Intensifying is simply increasing the opacity of a negative. There are many methods employed for this purpose, but two are chiefly used, both being distinct from each other in the action of the chemicals employed. We will describe both, but recommend the use of the first.

133. **Methods of Intensifying.**— The first is simply increasing the density by thickening the deposit of the metallic silver. The second is by substituting another metal for the silver, having a more opaque color, causing the negative to become less transparent.

We recommend the first method, as it is the most simple to apply, and there is less danger of staining and other failures.

134. **Kind of Negatives Which Can Be Successfully Intensified.**— All weak negatives cannot be successfully intensified, but all can be improved, in some cases, however, but slightly. The following are the kind of negatives which can be materially improved by intensifying: Negatives which are fully timed and under-developed; negatives which are slightly under-timed and under-developed, having some detail in the shadows but lack strength; negatives which were over-timed and under-developed, having plenty of detail, but no strength to the highlights.

135. **Intensifying Formula.—**

Warm water	12 ounces.
Bichloride of Mercury	½ ounce.

Label this bottle "Poison" Intensifying Solution No. 1.

136. **Dissolving the Mercury.**— The bichloride of mercury will dissolve very slowly, but by persistent shaking most of it will dissolve. If particles remain undissolved use only the clear solution, as one of these small particles coming in contact with the negative is apt to leave an opaque spot.

CLEARING SOLUTION NO. 2.

Sulphite of Soda, Hydrometer test 10 to 12 degrees. (Or if by weight)
Sulphite of Soda — Anhydrous..... ½ ounce.
Water..... 18 ounces.

The exact strength of clearing bath is not essential. Therefore, for convenience you may use your regular Sulphite Soda Stock Solution used for developing, and dilute it one-half by adding an equal amount of water.

137. **Preparing the Plate to Receive the Intensifier.**— To intensify proceed as follows: First, place your plate, or plates, in running water for at least ten minutes, soaking the film thoroughly so that the chemicals will effect all portions evenly when applied. Use a tray just large enough to hold your plate, one that has not been used for any other chemicals. While your plates are soaking in the water place three ounces of your intensifying stock solution in your graduate, being careful that your graduate is perfectly clean, as the least bit of alkali or pyro would spoil the bath, and render it useless. Add to this mercury four ounces of water. Mix this solution thoroughly before you pour it into your tray.

138. By this time your plates have become thoroughly saturated with water. Pour off the water, and pour on your intensifying solution. Keep the solution flowing over the plate by rocking the tray until the surface becomes perfectly white. Occasionally examine the plate by looking through it to the light. When the plate appears dense and the surface is quite white, and in your judgment the plate has been intensified far enough—taking into consideration that the plate will lose some of its density in the clearing bath—then rinse it carefully in clear water for a few moments, and place the plate in the tray containing sulphite of soda clearing solution. Rock the tray constantly, allowing the plate to remain in the sulphite until it has returned to its original color.

139. **Re-Intensifying.**— If you find after clearing that the plate does not contain the desired strength, repeat the operation, but before doing so wash carefully, thoroughly eliminating the sulphite of soda so that you will carry no sul-

pbite into the intensifying solution. This operation of intensifying can be repeated two or three times, and each time the negative will gain in strength. After the plate is sufficiently intensified and cleared, place in running water for not less than ten minutes, or until it is thoroughly washed, and then place in the rack to dry.

140. **When to Stop Action of Intensifier.**—The greatest difficulty in intensifying plates is to know when to stop. This can only be determined by careful observation, watching the plate carefully, examining the surface and color of density while the mercury is bleaching the plate, and carefully noting how much strength it is losing in the clearing bath. If the reader will observe, and make mental notes of the different results obtained, he will soon be able to judge by looking through the plate just how far to carry the intensifying. If the plate has not been carried far enough, as stated above, repeat the operation, paying close attention to its appearance in each condition, so that you may be able to judge your future results upon the first application.

GENERAL PRECAUTIONS TO BE OBSERVED.

141. **Rocking Tray While Intensifying.**—The trays must be continually rocked while applying either solution in intensifying to obtain even strength. The mercury trays should never be used for any other purpose, as mercury causes no end of trouble when coming in contact with other chemicals. Therefore, in order to avoid this danger it is advisable never to use mercury trays for any other purpose than for intensifying negatives, except for soaking the negative in plain water previous to intensifying. If, for instance, a plate is developed in a tray which previously contained mercury, even after careful rinsing, should the least trace of mercury

remain in the tray, black streaks would be likely to appear over the entire plate.

142. **Plates Becoming Stained by Intensifying.**— All plates must be thoroughly washed and freed of hypo before attempting to intensify. Plates which are not freed of hypo and in this condition are intensified will become stained. Owing to the presence of hypo in the film the clearing bath will affect the plate unevenly, parts of it (and sometimes all of the plate) will remain white, and not return to its original color.

143. **Strengthening Plate Without Clearing.**—A plate which is considerably under-timed, and has the least detail in the shadows and is not hard—dense in the highlights—can be improved somewhat by simply staining with the mercury. Such plates soak in fresh cool water the same as usual, and then immerse in the mercury intensifying bath until it has gained all the color it will. Then, without clearing in the Sulphite of Soda Solution No. 2, place the plate in clear water and wash thoroughly, and set in the rack to dry. The plate will be a cream color, and it is this color more than anything else that will aid you in obtaining detail, or printing quality. The color slows the action of the light in the printing, and your prints will be more solid, and have more depth and roundness. It is very essential, however, that you thoroughly eliminate the mercury solution from the plate by carefully washing before drying. Otherwise, the least trace of mercury will effect your prints, especially where platinum paper is used.

144. **Avoid Printing From Plates Lacking Strength.** — Never allow a negative that is not snappy to be printed from. It is not necessary, however, that a plate be thick and dense in order to be snappy. On the contrary, it is just the opposite. A good printing plate is quite thin, with clear detail in the shadows, and the highlights crisp but not hard. There must be half-tones in the strongest highlights. Such a negative will yield good prints. The majority of thin negatives are a trifle under-developed, making highlights a little mushy, with lack of crispness and roundness. Such

plates should always be intensified (strengthened), and the highlights built up a trifle.

145. **Light to be Used While Intensifying.**—As white light will not affect the plate, this work can be performed in subdued daylight, where you can judge the proper strength more accurately.

146. **Mercury Solution Can be Used Repeatedly Without Renewing.**—The mercury, or in other words Solution No. 1, can be used repeatedly. The solution used, however, should not be placed back in the bottle of stock solution, but should be poured into a separate bottle, and labeled "Intensifier ready for use." Should this bath by constant use become weak and work slowly, add to it a little of the fresh stock solution, thereby keeping the bath always in good working order.

147. **Clearing Solution Can be Used Repeatedly Without Renewing.**—The clearing solution, or sulphite of soda, can be used a number of times, as long as it will clear the plate by changing the color from white to original color. Just as soon as the action becomes slow it is advisable to discard it, and make a fresh bath.

148. **Special Formula For Strengthening Negatives of Uncertain Fixing.**—Another formula which we recommend in case there is any doubt in your mind as to whether the negative has been properly washed and freed of hypo, is as follows:—

Bichloride of Mercury.....	60 grains
Water.....	8 ounces

149. Add to this 150 grains potassium iodide, or enough to nearly dissolve the red precipitate first formed. Next add 120 grains of hypo-sulphite of soda in crystals, or sixty grains granular. In this solution immerse your plate until sufficient density is obtained. Examine the plate by looking through it, just as you would when using the single bichloride of mercury intensifier.

150. **Fixing the Plate.**—After the plate has taken on as much strength as you desire, place it in a very weak hypo-sul-

phite of soda fixing bath, hydrometer test ten degrees, for about fifteen seconds, after which wash thoroughly, and set up to dry. The image on the negative will then consist of a double iodide of silver and mercury of a reddish brown color, with good printing qualities. This latter formula is only recommended where there is any doubt as to whether plates are thoroughly fixed. In order to avoid using the last mentioned bath, and to be certain that the silver is entirely removed from the plate, it is advisable, after developing, to always fix a plate at least fifteen minutes after the silver has disappeared; then if you thoroughly wash, plates so treated can be intensified with the first formula given, which is most simple.

151. **Removing Varnish From Plates to be Intensified.**—There are times when a negative has been varnished for retouching, or for preserving the surface, which you afterwards decide should have been intensified. To intensify such a plate it is first necessary to remove the varnish. This you can do by soaking the plate in wood alcohol, and then with a tuft of absorbent cotton which has been thoroughly saturated with the alcohol, gently rub off the varnish, after which the negative should be placed in clear water to soak for about twenty minutes, when it will be ready for intensifying.

152. **Removing Varnish With Turpentine.**— Another method of removing varnish or retouching fluid, as well as the lead, from a plate, is to apply turpentine with a tuft of cotton. After the varnish is all removed rub the plate dry with a little dry cotton, and then soak in clear water for twenty minutes, after which apply the mercury.

153. **Plates to Use For Experimenting.**— It is advisable, in preparing this instruction, to make use of some discarded, thin, weak negatives for your first experiments, and intensify according to the formula given. After you become familiar with the effect of the chemicals applied, you can then use a plate which you desire to save and improve for future printing, and apply the intensifier to this plate.

154. In preparing results of this instruction one should make good proof prints before and after intensifying, and all data pertaining to the method of intensifying the plate should

be recorded on the back of the proof, always dating each proof and numbering whether first, second or third experiment. These proofs should be filed in your proof file for future reference, as they will be your guide in future experiments.

DIFFICULTIES IN INTENSIFYING.

155. **Negatives Appearing Oily.**— If the negative has not been sufficiently washed and there is hypo present in the negative, or if it was previously dried and then not soaked sufficiently in the water to soften up the film thoroughly, the negative will appear greasy. *Remedy:* If there is hypo present, intensify with the formula which contains hypo-sulphite of soda. If the plate has been dried a long time, soak longer in water before intensifying.

156. **Judging When Plate Is Carried Far Enough in Mercury.**— If the negative needs only a slight intensification, allow it to remain in the intensifier just long enough to whiten all over. If, after clearing, it is not strong enough repeat the operation. In time you will be able to judge by the appearance of the image on the surface, and by looking through the negative. The negative, as it grows white in the intensifying solution, apparently becomes a positive and, if a black rubber tray is used, it acts as a black backing, and with very little practice you will readily see the image gain in strength on the surface. By close observation and practice you will soon be able to judge very accurately.

157. **Negative Intensifying Unevenly.**— If there are spots which do not turn white, this is a certain sign that the plate was not thoroughly fixed, was not allowed to remain in the hypo long enough. The portions not fixed will not be affected by the mercury. In such cases, intensify with the formula which contains hypo-sulphite of soda, and is intended for intensifying plates which are not thoroughly washed.

158. **Negative Stained After Going Through Clearing Bath Sulphite of Soda Solution.**— This is a certain sign that the negative was not thoroughly washed after fixing. If the negative is stained evenly it will do no harm; on the contrary it will add strength to the printing quality of the negative.

159. **Negative Not Clearing in Clearing Solution.**— If the sulphite clearing bath has been properly prepared, and if good sulphite was used, the negative will usually return to its original color. Should it fail to do so, first test the bath and see that the sulphite of soda is full

strength. Use a fresh clearing bath. An over-worked clearing bath will work slowly. Often a weak solution of ammonia will act when the sulphite has failed.

160. **When to Use Ammonia Clearing Bath.**—On under-timed plates the increase in intensity is generally not very great, and as the plate loses some of its density in the sulphite of soda clearing bath, and as ammonia clearing does not reduce as much as sulphite, it is advisable to use ammonia for clearing on all plates that are under-timed, and need strengthening. Ten to twelve drops stronger ammonia in half-pint of water will clear the plate nicely, and may be used in the above cases.

161. **Shadows Remaining Weak After Intensifying.**— If your negative is badly under-timed it is impossible to produce any detail in the shadows by intensification. The best way is to simply bleach the negative with mercury. Do not place in the clearing bath (sulphite of soda), but after staining all you can, wash thoroughly and set up to dry. The stain, if not cleared up, will slow the printing and give you all the detail it is possible to obtain from such a negative, and more solid prints will result.

162. **Negative Intensifying in Streaks.**—If the plate is placed in the intensifying solution, and allowed to remain there without agitating, the intensification is apt to be streaky. *Remedy:* Always rock the tray both when intensifying and clearing.

163. **Small Opaque Spots Irregular in Shape and Size.**—Opaque spots are generally caused by undissolved particles of bichloride of mercury coming in contact with the surface of the negative. *Remedy:* Always use the decanted clear solution.

164. **Intensifier Will Not Work After Using a Few Times.**— If the intensifying solution refuses to work, it is because the mercury by constant use has become weak. *Remedy:* Strengthen by adding a trifle of fresh stock solution of bichloride of mercury, or if it still refuses to act, then the life of the mercury has become entirely exhausted, and you should make up a new bath.

165. **Intensifying Solution Becomes Milky.**— This is caused by some of the sulphite clearing solution getting into the bichloride of mercury solution. *Remedy:* Discard this solution. Make up a new one, and be careful to never allow the sulphite solution to come in contact with the mercury. If you place your fingers in the clearing bath (sulphite of soda), wash them thoroughly before placing in the intensifying solution.

166. **Appearance of Old Negatives Which Have Not Been Properly Fixed and Washed.**— If the negative is very old, and it contains hypo, there will appear a vapor-like scum on the surface. It is then best to assume that it has not been properly fixed or washed, and if such a neg-

ative is to be strengthened, intensify with intensifying solution which contains hyposulphite of soda.

167. **Removing Varnish.**—By carefully following the instructions given in the lesson, you should have no trouble in removing varnish. If the turpentine will not remove the varnish, try soaking the plate in alcohol. If when the plate has been soaked in wood alcohol, you find after rubbing with absorbent cotton that there still remains varnish, soak longer, use fresh alcohol, then wash for twenty minutes in running water, and you will find that all the varnish has been removed.

ADDITIONAL INTENSIFYING FORMULAE.

Mercury Bromide Intensifier.

Bichloride of Mercury	30 grs.
Bromide of Potassium	30 grs.
Water (warm)	6 ozs.

Add one ounce of the above solution to 4 ounces of water; in other words, enough water to cover the plate being intensified.

When thoroughly bleached in this solution the negative may be blackened in the usual way, by placing in the sodium sulphite bath, testing about 40 hydrometer test.

Monckhoven's Silver Intensifier.

Solution A.

Bromide of Potassium	60 grs.
Bichloride of Mercury	60 grs.
Water	6 ozs.

Solution B.

Cyanide of Potassium	60 grs.
Nitrate of Silver	60 grs.
Water	6 ozs.

The silver and cyanide are dissolved in separate lots of water (3 ozs. of water for each), and the former added to the latter until a permanent precipitate is produced. The mixture is allowed to stand in the sun for 15 minutes, and after filtering forms Solution B.

Place the negative in Solution A until it becomes white; then rinse and transfer it to Solution B to blacken. If the intensification has been carried too far, it may be reduced by treatment with a weak solution of hyposulphite of soda.

CHAPTER VI.

LOCAL INTENSIFYING.

168. The object of Local Intensifying is to strengthen only parts of the plate which are weak. There are cases where, if we strengthen only a portion of a negative and allow the rest to remain as it is, the printing quality of the negative will be greatly improved. There may be portions of a negative which are a trifle soft, which, if strengthened, will produce stronger highlights. Often in a landscape the sky and distant objects are strong, but the foreground, especially if there is much green foliage, is thin and prints black. This foreground should be strengthened by local intensification. As there is danger of the solution spreading beyond the parts you desire to strengthen, great care must be exercised in doing the work. The greatest difficulty lies in applying the intensifier only to the parts that you desire to improve, avoiding its spreading to the parts that are already strong enough.

169. **How to Proceed.**— Place the negative which you desire to intensify locally, in a tray of water, and allow to soak for about ten minutes, or until the film has become thoroughly saturated with water. While the plate is soaking prepare the intensifying solution :—

Intensifying Stock Solution No. 1	2 ounces
Water	4 ounces

170. Place this intensifying solution into the tray that you have set aside to be used only for intensifying, and immerse

the negative for a moment. Do not wait until the plate has turned white. The object of this is to slightly stain the entire plate, so that when you are applying the intensifier locally there will be less danger of staining should it happen to spread. Should it spread slightly beyond the parts you wish to strengthen it will spread gradually, and do no harm. Still had you not previously immersed the entire negative, giving it only a slight stain, it would be very noticeable. After immersing the entire plate for a moment, and rinsing as already stated, set it up to drain for a few minutes. While the plate is draining, pour about one ounce of the intensifying solution into a small dish, or saucer, and add to this two ounces of water. Next dip the fine point of a small camel's-hair brush in the solution which you have poured into the saucer, or dish, and apply to the parts that you wish to intensify. Be careful to use only a little intensifier, and apply only on the parts to be strengthened. If it spreads, immediately rinse the plate under the tap, and try it again. Always touch the brush in the exact center of the part which you intend to intensify.

171. **Why a Weak Intensifying Solution is Used.**—You will note the intensifying solution for local intensifying is much weaker than the solution used when intensifying the entire plate. This is because with a weaker solution you have better control of the intensification, and there is, therefore, less danger of over-doing or intensifying parts of the negative which should not be strengthened. Too strong a solution will have a tendency to spread. A weak solution is easily controlled during the application, with little danger of injuring other parts of the plate.

172. After you have obtained the desired strength in the weak portion, rinse in clear water, and then re-immerse the entire plate in this weak intensifying solution. This final immersion is given for the same reason that you immerse the plate before the local application. However, at this time your plate has been materially strengthened locally, and if any of the solution has spread beyond the parts intended, it is apt to be noticeable unless the plate is again immersed for

a moment or two, just enough to nicely blend the local work to the remainder of the plate.

173. **Clearing the Plate.**—After this immersion, rinse the plate carefully for a minute and then immerse in the sulphite of soda clearing bath, until the entire plate has resumed its original color. Use the clearing bath given in instruction on INTENSIFYING, PART I. (See paragraph 136.) There is absolutely no excuse for a flat printing negative, for if by improper treatment in the developer or improper exposure the developed plate is flat and lacks snap and contrast, one can strengthen the highlights, lighten the shadows, supply catch lights to drapery, lighten the hair where it is too dark and build in detail in the dense shadows, etc. For landscape work the improvements are still more apparent, in fact, with proper care one can produce almost any result. You must work cautiously, however, as great care must be exercised when applying the mercury locally, or you may ruin the negative.

174. CAUTION :— Bear in mind that the plate must have been thoroughly washed and freed of the fixing salt (hypo-sulphite of soda) before you attempt any intensification. If, after the negative is dry, you find it is not strong enough, repeat the operation, and in this case you need not place the whole plate in the intensifier, but soak in clear water for ten minutes; after which apply the intensifying solution with the brush to the parts you desire strengthened, exactly as in your first operation. When you have the proper strength, clear the plate in the sulphite solution, and then wash thoroughly and dry as usual.

175. **Locally Intensifying Negatives While Dry.**—Another method which is very practical, and which one should experiment with, is intensifying the negative while it is dry. To do this place on a piece of glass a few drops of the weakened mercury solution. To this add two or three drops of glycerine, and mix thoroughly. The glycerine will prevent the solution from spreading on the plate. Dip your brush in this solution, and apply carefully to the parts to be strengthened, always touching the center of the part first, and being careful

not to have too much of the solution in your brush. Allow this to remain on the parts until the desired strength has been gained. Then rinse and place in the sulphite of soda clearing solution, after which thoroughly wash and set up to dry.

176. **Plates to Use for Experimenting.**—For your experiments we would advise that you use discarded plates. After you have full control of the solution and can apply the liquid as you want it, without spreading, take up a good plate which you think can be improved by this treatment. Then proceed to carefully apply the solution where it is needed, working from the center, and blending gradually from the stronger highlights.

177. **When to Apply the Intensifier.**—As in reducing, the best time to apply the intensifier is immediately after the plate has been thoroughly fixed and washed. The gelatine film being swollen is most receptive and the intensifying is quickly done. Always be sure that the plate is perfectly washed after developing and fixing before intensifying, for if any trace of hypo is left on the plate it will cause a stain. The plate must also be thoroughly washed after intensifying.

178. In preparing results of this instruction, the same methods must be pursued as with the other instruction. Make good proof prints from each experiment, numbering them in regular order, and noting all data pertaining to the manipulation on the back of each proof, thus supplying valuable data for your future guidance.

DIFFICULTIES — LOCAL INTENSIFYING.

179. **Parts not Improving by Intensifying.**—If the negative has been fixed in an acid hypo bath, or the plate was placed in a hardener, it will be almost impossible to intensify successfully. A plate of this kind should be thoroughly soaked in water for hours, and often you will find it necessary to strengthen the intensifying solution.

180. **Intensifier Spreading.**—To overcome this difficulty be very careful when applying the intensifier. As soon as there are signs of intensifier spreading, rinse and drain for a few minutes, and then apply

again, being careful to have only a little of the intensifying solution in the brush, and applying it exactly in the center of the part you wish to intensify. If it again spreads rinse at once, and repeat the operation. If this is not successful use the glycerine formula.

181. **Judging When Sufficiently Intensified.**— Only practice and close observation can teach you this. It is always safe to stop the intensifying a little before you think it is strong enough, and repeat the operation if you find the parts have not gained enough in strength.

182. **Intensified Portions Stained After Going Through Clearing Solution.**— If there is any hypo present in the plate it will always stain. If the clearing solution is not strong enough you will obtain a stain. If the plate originally was discolored a trifle, this stain will appear considerably stronger. Be sure and use fresh clearing solution, and see that your plates are thoroughly freed of hypo before attempting to intensify.

183. **Parts not Improved by Intensifying.**— A very badly underexposed plate can never be locally intensified successfully, as the shadows have nothing in them. The highlights should always take on a certain amount of density. If any part you wish to strengthen turns to a white or cream color, you can be sure that it is somewhat strengthened. In some cases you will find it best not to clear the plate after intensifying; allow it to remain this cream color, as the stain color will slow the printing, and assist in supplying strength and detail.

184. **Plate Refusing to Clear in Clearing Bath.**— See Difficulty, INTENSIFYING, PART I, paragraphs 159–160.

185. **Applying the Glycerine Intensifier to Dry Negative Without Effect.**— This is probably due to the plate being fixed in a hardening bath, or an acid hypo. Hold the plate flat, and apply the solution freely, and allow it to remain on the plate for a little while. It may take some time for the solution to take effect, and make any change.

186. **Glycerine Intensifier Spreading.**— To overcome this difficulty add a drop or two more of the glycerine, and be careful not to apply too much of the solution to the part of the plate which you intend to intensify.

Any other difficulties met with are very likely covered in PART I.— INTENSIFYING.

"AT PEACE"

STUDY No. 4, See Page 389 DR. A. R. BENEDICT, MONTCLAIR, N. J.

CHAPTER VII.

DEVELOPING OVER-EXPOSURES.

187. The exposing of plates, or film, beyond the latitude in which they may be developed in a normally prepared developer, should be avoided wherever possible.

188. Until one becomes thoroughly trained in the required amount of exposure to be given they will occasionally misjudge the necessary exposure, and in the majority of cases such plates or film are over-timed. The object of this instruction is to correct these exposures in the development, and thereby produce good printing negatives, which, if developed, in the ordinary way, would be lost.

189. **Construction of Sensitive Emulsion.**— Before taking up the manipulation of over-exposed plates generally, we will consider of what the sensitive emulsion on a dry plate is composed, and how constructed. The emulsion of a dry plate is a mechanical mixture of some viscous substance, and sensitive salts of silver in extremely minute divisions. These minute particles of silver are held in suspension by the viscous substance, which may be either gelatine, collodion or albumen. For the dry plate, however, it is generally gelatine.

190. To more clearly explain why the silver salts are distributed in minute particles, and held in suspension in the emulsion, suppose we pour into a graduate a certain amount of water. To this we add a small quantity of common table salt, and then add a little nitrate of silver solution. The entire solution will immediately assume a milky appearance, because we have formed, when mixing these ingredients, silver chloride. This silver chloride will, in a very few minutes, fall to

the bottom of the graduate, and the clear solution of water may then be decanted. If, however, you substitute a warm solution of gelatine, or some gummy substance, in place of water, and then add the salt and nitrate of silver, you will obtain the same milky appearance, but the minute particles of sensitive silver salts will remain suspended. With these ingredients for the principal basis, a sensitive emulsion is formed which can very readily be flowed over a glass plate or film. When this emulsion is set and dried upon the glass it is then termed a Dry Plate, which is very sensitive to light.

191. When we place the dry plate in the plate holder, and attach it to the camera, it is ready for exposure. The slide being drawn, and the shutter opened, or the cap removed from the lens, thereby exposing the plate, the light admitted through the lens effects these minute particles of silver which are suspended in the gelatine. A certain amount of light is required to perform this work, and this amount of light you measure by the length of the exposure. If more than the necessary amount should be given, the plate will require treatment in the development of the image, to overcome the excess exposure given.

192. **Action of Light on Dry Plate as Compared to Printing-Out Paper.**— This action of the light on the dry plate is in some respects similar to that of sensitized printing-out paper. If you place a piece of printing-out paper on a negative, and place it in the sun, the light affects the parts of silver in the emulsion on the paper in the same way as on the dry plate, the only difference being that the emulsion on the paper is of necessity made less sensitive than the dry plate, because the emulsion used for sensitizing paper contains materials that cause the image to become visible as it prints. Therefore, you can see the image appear during the exposure on the paper, while it is invisible and does not show on the dry plate. The sensitive emulsion of a dry plate is also many times more sensitive than that of a printing-out paper; therefore, while practically the same action is taking place when the light comes in contact with either of the two, yet its action is much slower on the paper than on the plate.

193. If you were to continue printing sensitized paper beyond a certain stage, you would have over-printed; and the print would be too dark, and entirely worthless. This is exactly what happens to a dry plate when it is over-exposed. The plate, like the over-printed print, has become too dark, as it were, but unlike the print it is not lost, providing the proper measures are taken to cut off or remove some of the minute particulars of sensitive silver salts, which have been acted upon by the light.

194. **Restraining the Sensitive Emulsion.**—To illustrate: The sensitive emulsion on the plate is composed of layer upon layer of these minute sensitive silver particles. If you exposed the plate and gave two seconds' exposure and the correct exposure required but one second, it becomes necessary to cut off or make a number of these layers of minute silver particles unchangeable. Or, in other words, restrain them from developing so that when the developer comes in contact with them it will have no effect. This is generally done either by immersing the plate before developing, in a bromide of potassium solution, or, developing in old developer (developer that has previously been used), and which, of course, contains bromide; the bromide having been liberated from plates previously developed. For description of the action of bromide, see paragraph 35—DRY PLATE DEVELOPING.

195. **Why Plates are Over-Timed.**—The best photographers are apt to misjudge the strength of the light employed, sometimes due to the variance of the light at different times of day, or conditions of weather (cloudy or dark days), but more especially when they are in a hurry. While no two photographers will work alike, although they are aiming for the same effects, each has his one peculiar way of controlling and measuring the light employed in producing the desired result. Yet, there is one point upon which all agree, that is, that an over-timed plate, or film, is preferred to an under-timed one. The reason for this is that sufficient exposure is always required to supply detail to the shadows, and in an over-exposure we are always sure of the necessary detail even in the deepest shadows, while

in an under-exposure this detail is generally lost. It is much easier to rectify the exposure so as to retain the detail in an over-exposed plate than it is to obtain detail in a plate, or film, which has been under-exposed. The reason is that with an under-timed plate the exposure has been insufficient to supply the necessary detail, and even with the most careful handling in the developer sufficient detail cannot be produced, especially if the plate is very much under-timed. In some instances, however, if not badly under-exposed, fair results can be obtained in an under-timed plate, but the results are uncertain. With an over-exposed plate one can always regulate the developer so as to produce negatives with good printing qualities. It is for this reason that many plates are over-timed.

196. **Use of Old or Once Used Developer.**—In order that you may at all times be supplied with a restraining bath that may be applied to plates that are over-exposed, it is advisable to save the last normal developer used. It is a good practice also, after each developing in normal developer, to pour the solution used into a wide-mouthed bottle. The reason for using a wide-mouthed bottle is that it is much easier to decant the clear liquid from such a bottle. It is also much easier to pour the used developer into a large-mouthed bottle without the use of a funnel. In order to keep the developer free from dust, cover this bottle with a piece of glass, or cork it. This old developer having become charged with bromide liberated from the plates previously developed, will make a good restraining bath. This used developer will become somewhat discolored, but the very fact of its being discolored makes it all the better. This discoloration will prevent the light from the ruby lamp—even though slightly actinic—from affecting the plate while in the developer.

197. **The Use of Two Trays For Developing.**—In case of uncertain exposure, whether over or under-timed, and even for properly timed plates, a good method to adopt is to use two trays for developing. The reason for this is that should you find a plate over-exposed you can immediately transfer it to the tray which contains the old developer. Use one tray for normal developer, starting all plates in this. In

the other pour the old developer previously used, decanting clear solution. By clear solution we mean, not a solution that is clear in color, but simply clear of particles of dirt, or film, which might have come from the plates that were previously developed. Having placed the plate in a normal developer, watch it very closely and when the image begins to appear examine the plate and note the parts which should appear first. The parts which will naturally appear first will be the highlights, or the whitest parts of the image. Note if the shadows are holding their relative value to these highlights.

198. **Developing Different Brands of Plates.**—By relative value we mean the natural gradation from the highlights to the deepest shadows, taking, of course, into consideration that different brands of plates develop differently. For instance, with Cramer plates the entire image, both highlights and shadows, will appear, if not over-exposed, at about the same time; that is the highlights will be closely followed by the shadows. However, each light and shadow will appear in their proper tone and will grow stronger as the plate continues developing. When developing this brand of plate with correct exposure, you pay little attention to the shadows, so long as they remain clear, but develop entirely for the highlights in order to obtain their proper strength. When they are fully developed the shadows will also be developed.

199. In case, however, of over-exposure on Cramer plates, the shadows will flash up quickly, and be quite hazy. They will have a foggy appearance, there will be a lack of distinction between highlights and shadows. The entire plate will appear fogged, the amount of fog ranging according to the over-exposure. If only slightly over-timed, the fog visible will be only slight. If very much over-timed the fog will not appear greater but much earlier (quicker). In either case, place the plate immediately into the tray containing the old developer and allow it to remain there until the fog is checked and the plate is sufficiently restrained, always rocking the tray to keep the developer moving.

200. With almost all other brands of plates the highlights appear some little time before the shadows. Even if over-

timed, the highlights will appear first, then the middle tones and finally the shadows, but if over-timed the shadows will soon begin to fog over. As soon as they show signs of fog, indicating over-exposure, they should be restrained at once by placing them in the old developer. When developing any brand of plate bear this in mind, because, should the image flash up quickly, the shadows appearing at almost the same time as the highlights, you will know the plate is over-timed and you should immediately transfer it to the tray which contains old developer. If the plate seems quite hazy, indicating very much over-exposure, then add to the old developer, a few drops of ten per cent. solution of bromide of potassium, a stock solution which should be kept on hand at all times.

201. **Preparing a Ten per Cent. Solution of Bromide.**—To prepare this stock solution in a twelve-ounce bottle dissolve one ounce of bromide potassium in ten ounces of water, which, when dissolved, will give you practically a ten per cent. solution. The old developer, and additional bromide acting as a restrainer, checks the further development of the shadows, and permits the developing agent (pyro), to build the highlights to their proper density.

202. **Developing Extreme Over-Exposures.**—In case the plate is very much over-timed, it may require more dense developing than for normal exposure. This you can do by simply allowing the plate to remain in the developer longer than usual, even in the restraining bath. This prolonged development may be necessary in order to produce the desired contrast. No matter how strong a plate is developed, it is not carried or developed far enough unless the desired contrast between the highlights and shadows is visible, even if the plate does appear extremely dense.

203. When the desired contrast is reached, the plate may be fixed in the regular hypo bath. After fixing, the plate should show a fine contrast and a beautiful negative except that it is very hard and dense and would not produce a good print. Therefore before washing place this plate in your reducing tray and reduce it to the proper strength. (See Instruction on REDUCING.) After reducing, rinse off both sides

in plain water, return the plate to the hypo bath for a few minutes and then wash thoroughly and place in the rack to dry. In case the plate is so much over-exposed that it becomes fogged, even in the restrained developer, then carry it as far as possible in the developer so that the plate is quite dense throughout. Then fix, after which *reduce* very thin — thinner than you desire the finished negative. This will remove all fog. Wash well, after which intensify to the proper strength. (See Chapter V for INTENSIFYING.)

204. **Reducing Over-Developed Plates.**— You will notice by reference to the instruction on REDUCING that we recommend two different formulæ for reducing, one of which acts on the highlights almost entirely. This is the persulphate of ammonia reducer. (See paragraph 274.) The red prussiate bath, while it acts upon the highlights, also reduces the shadows. (See Chapter X on NEGATIVE REDUCING.) Before reducing an over-exposed plate which has been purposely over-developed, you must examine the plate thoroughly in order to determine which solution to use. If your plate is strong in the highlights only, and the shadows are clear and about the proper strength, you must use the solution that acts mostly on the highlights, which would be the persulphate of ammonia. On the other hand, if the plate is developed quite evenly and needs a general reducing in both highlights and shadows, use the red prussiate of potash. You will find a plate which has been extremely over-exposed and over-developed should always be reduced with the red prussiate of potash, for the reason that both the highlights and shadows are very much too strong and an equal reduction is required.

205. **Restraining the Plate too Quickly.**— CAUTION: When developing a plate and you find it over-timed, do not be in too big a hurry to place it in the restraining bath; allow it to develop until you have secured the necessary detail in these shadows. However, in a very much over-timed plate there is danger of waiting too long. You must, therefore, carefully watch the plate and just as soon as you find that instead of the detail in the shadows gaining strength

they are becoming flat — fogging over — at once place your plate in your restrainer. On the other hand, if you have not developed your detail before the plate has reached the restrainer you will have difficulty in obtaining it afterwards. Your restrainer prevents the shadows from building up and permits the highlights to strengthen while the shadows are being restrained, or, in other words, the shadows have stopped developing.

206. **Plate Developed Too Far Before Restraining.**— In case the development has been carried too far in the normal developer before restraining, and you have clogged the shadows, then it will require further development in the restraining bath. In other words, allow it to remain in the restraining bath considerable longer so as to build up the required contrast which must be obtained before the plate is fixed. A plate of this kind may appear extremely dense, so dense that it is almost impossible to see through it when holding it up to the light. This, however, must not alarm you because you cannot injure the plate no matter how dense it may be, as after fixing you reduce the entire plate to where you want it, and you will have obtained a negative of good printing quality.

207. **Treatment of a Plate Which You Know Before Developing to be Over-Timed.**— If you are aware in advance that a plate is over-timed, then in place of starting to develop it in normal developer start it in old developer first. If you have no old developer on hand, add a few drops of bromide solution to fresh developer. This will answer the same purpose.

208. Always have on hand a ten per cent. solution of bromide of potassium. Have it ready in case of over-exposure. A few drops added to the developer will add much to your restraining. If you have started a plate in normal developer, and you find it slightly over-timed, and needs restraining, do not add bromide while the plate is in the solution, but remove the plate, holding it under a tap of running water. While adding the bromide to your bath, rock the tray thoroughly, thus mixing the chemicals. Then

return the plate to the bath. This must be done rapidly, because even though your plate is removed from the bath it will keep on developing.

209. **Treatment of Plates Slightly Over-Exposed.**—In case the plate is slightly over-timed, and needs only a little restraining, we would advise using only half old and half new developer. The old developer will have sufficient bromide in it to restrain the shadows while developing until the high-lights are carried to their proper strength. Sometimes a plate that has been only slightly over-timed may be restrained too much, and the consequence would be that you would produce a contrasty negative with no detail in the shadows. As soon as a plate during development shows signs of too much contrast, immediately rinse in plain water, then place it in a normal developer, in which conclude the developing. This may also be the case with very much over-timed plates, where a too strong restrainer is used. If you find the plate building up with too much contrast, immediately rinse the plate in clear water, and transfer to normal bath.

210. **Practice Work.**—In preparing this instruction, you make two exposures of the same subject under the same conditions, over-exposing both. Develop one in normal developer, and the other treat according to instructions given in this instruction for over-timed plates. Dry the negatives, and make good proof prints. Carefully note on back of prints which method of developing was employed, and any data relating to the manipulation, such as time required for complete development, first appearance of image indicating over-exposure, how restrained. Each print must bear the exposure given; this is important.

CHAPTER VIII.

DIFFICULTIES—DEVELOPING OVER-EXPOSURES.

211. **Action of Developer on Over-Exposed Plates.**— A plate that is over-exposed will flash up quickly, as soon as the developer is flowed over it. The quicker an image appears or flashes up the more it is over-exposed. The image on a plate or film, normally exposed, should appear in not less than one-half minute, much depending upon the strength and temperature of the developing solution. Warm developer will develop more quickly than cold. Strong developer will also develop more rapidly than normal or weak developer. The entire outline of the image on a normally exposed plate will generally appear in from thirty to fifty seconds, and the image on the plate will gradually continue to grow, until the entire image is developed. The image flashing up in from five to eight seconds is over-exposed and must be restrained immediately, and the amount of restrainer must be judged by the rapidity of the appearance of the image. The quicker the image appears the stronger must be the restrainer. The following suggestions may be of service to those whose practical experience in the handling of over-exposures has been limited. These suggestions are based on the presumption that only pure chemicals are used in preparing the developer, and that they are mixed according to the formula and, of course, the plate must be started developing in normal developer.

212. *First.*— If the image appears in thirty to forty seconds, the exposure is normal and should be developed to completion in the normal developer.

213. *Second.*— If the entire image appears in eighteen to twenty seconds, the plate or film has been over-timed beyond the latitude for development in a normal bath, and the plate should be restrained at once, either by adding one-half old bath to the normal developer, or by transferring the plate to a tray containing old or once used developer, allowing it to remain in this bath for two minutes. If then it shows too much contrast, rinse it in clear water. Then return the plate to the tray of normal developer and conclude the development in this tray.

Should the plate or film after being two minutes in the old developer, appear flat and without contrast, then complete the development in the tray of old developer.

214. *Third.*— If the image appears in fifteen seconds, the plate or film is considerably over-timed, and about ten drops of a ten per cent. solution of bromide should be added to the old developer, and the plate transferred at once from the normal bath to the restraining bath. The tray must be agitated continually and the plate examined occasionally, and if the bath is not too much restrained, the development may be concluded in this bath.

215. *Fourth.*— Should the plate flash up in eight to ten seconds, the plate is very much over-timed, and should be placed in a bromide restraining bath, made up as follows: To three ounces of water add one and a half drams of ten per cent. solution of bromide. Immerse the plate in this bath for one minute. Then transfer to a tray containing old developer, and conclude the development in this bath. Should the plate, or film, show signs of over-restraining and develop too contrasty, then return the plate to the normal developer.

216. *Fifth.*— If the plate flashes up in from three to five seconds, or almost immediately after developer is flowed over it, the plate is greatly over-timed and should at once be placed in a tray of old developer and allowed to remain there while preparing a bromide bath of two ounces of a ten per cent. solution of bromide and four ounces of water. Transfer the plate immediately to this bath, allowing it to remain for two minutes. Then return to the tray of old developer for final development, and if necessary in order to obtain strength, finally finish the development in the normal bath.

217. **Developing Plates of Doubtful Exposure.**— There are times when one is obliged to make an exposure under circumstances which make it difficult to judge the exact exposure required. Under such conditions it is always advisable to make two exposures, one of which should be according to your judgment of the proper exposure; the other give a longer exposure, or, in other words, over-time it. Mark both slides, and make a memorandum of the exposure given, and when you come to developing, develop first the plate which in your judgment was the normal or proper exposure, starting it in normal developer. If it proves over-timed transfer it at once to the tray containing old developer. If it develops slowly, indicating under-exposure, add more water to the normal developer. The developing of this first plate gives you a key to the second plate. If the former was over-timed then you would start the second plate in old developer, and if the first was considerably over-timed, then you will need to restrain the second one considerably. You should then add to the old developer two drams of the ten per cent. solution of bromide. On the other hand, should the first plate prove under-timed slightly, the second plate should be developed in

normal developer. Under all circumstances, your first plate supplies you a key for the treatment of the second one.

218. **Judging During Development How Much the Plate Is Over-Exposed.**— It often occurs that the photographer, during the course of a day's work, makes a number of exposures, and, in his judgment, correctly times all of them. However, when he comes to developing his first plate he finds that he has erred in his judgment, and the plate is over-exposed, realizing that all plates exposed that day are over-timed. It is a question now as to how badly each plate is over-exposed and how to treat the remainder of the plates so as to produce good results. All will depend upon the first plate developed. This first plate is your key and will indicate how much over-exposed the remainder of the plates are.

219. If they are only slightly over-timed, it is advisable to develop them in the old normal developer from the start. You must bear in mind that this old, or once used normal developer, must not contain any other restraining properties. In other words, this developer has been used as prepared according to the formula and has not been altered in any way. If, for instance, bromide had been added to the normal developer, this would cause the old developer, when used on only slightly over-exposed plates, to develop too contrasty. Therefore, use old developer which was prepared normally and has developed one lot of plates only. Such a developer usually will restrain the plate sufficiently and good crisp negatives will result. However, if the first plate developed appears quite hazy, it may be well to add a few drops of a ten per cent. solution of bromide to the used normal developer. It is well, under such circumstances, to develop each plate separately until you arrive at a developer that is sufficiently restrained to produce good, crisp negatives from the start; then the remainder of the plates should be developed in a developer made accordingly.

220. After a little practice one will be able to judge by the appearance of the first plate developed exactly how much the others are over-timed, and will know exactly how much restraining is required.

221. **Obtaining Desired Contrast of Over-Timed Plates.**— When a plate is only slightly over-exposed, treat it according to paragraph 32, Instruction, DRY PLATE DEVELOPING. If, however, it is badly over-exposed and you are developing according to instructions, and you cannot produce the desired contrast, it is because you did not allow the plate to remain in the restraining solution long enough before transferring to the normal developer. Or, if the plate was started in the normal developer, you may have allowed it to remain too long in this developer before checking or restraining. In either case if the plate shows flatness throughout the development, you must then over-develop to an extreme, and after fixing the over-developed plate then reduce it according to Instructions on REDUCING OVER-DEVELOPED PLATES.

222. **Obtaining Clear Shadows.**— You can only retain clear shadows in developing, should the plate be over-exposed, by the proper

amount of restraining, either by the use of sufficient bromide, allowing the plate to remain in the bromide solution sufficiently long to properly restrain the shadows from developing before transferring the plate to the normal developer; or, by the use of old developer and the plate remaining in this old developer sufficiently long before transferring to the normal developer. The amount of restraining all depending on the amount the plate is over-timed. Bear in mind at all times that a plate that has been started in normal developer which proves to be over-timed will be fogged, and sort of a veil will appear over the shadows if the plate is allowed to remain too long in normal developer before restraining, no matter what restraining methods you use.

223. It is, therefore, evident that the first few moments the plate is in the developer are the most critical ones. It is during these moments that you must watch the progress of the plate, and the instant it shows signs of over-exposure the proper restraining must be done at once in order to retain clear shadows.

224. Again, you cannot expect to obtain clear shadows if your developing light (ruby light) is too strong. A light which would be perfectly safe, for correct exposures, may not be safe for over-exposures. The developing of an over-timed plate is slower than that of a properly exposed plate; consequently, the over-timed plate is exposed to the ruby light longer than a normally exposed plate, and, therefore, is subject to more or less fog from this light. It is well, under such conditions, to do your developing farther away from the ruby light so that only weak light falls upon the tray containing the plate and developer.

225. Sometimes high temperature in the developer or developing room, will cause foggy shadows. Constant placing of the warm fingers in the developer will warm the developer, and the solution exposed to the air for a long time is apt to become the same temperature as the dark room, and will, therefore, cause fog.

226. It is advisable when your plate is placed in a tray of restraining developer to place a cover over the tray, but do not neglect to rock the tray, because this is necessary to insure even development.

227. **How Far to Carry Development of Plates that Are Over-Exposed.**— The development of an over-exposed plate depends entirely on how badly a plate is over-timed, and how early the plate has been restrained in the development. It is far better to over-develop a plate, and after fixing, reduce it, than to under-develop. By over-developing an over-timed plate, you are aiming to build up your highlights. You realize that your shadows have sufficient strength, but the strength of the highlights are not sufficiently in advance of the shadows. Therefore, you carry the development farther to build up the highlights, knowing that the restrainer used in the development will, to a certain extent, hold back the shadows while the highlights are growing in strength. In other words, by over-developing you produce stronger highlights, and then by finally reducing with red prussiate of potash

(See Chapter X on REDUCING), you reduce the shadows equally, if anything, slightly more than the highlights and the result is a negative of proper contrast.

228. On the other hand, if you under-develop, you produce thin negatives with apparently plenty of detail but no contrast and no solidity, and absolutely no printing quality. Therefore, it is advisable until one becomes familiar with the proper developing of plates, under all conditions, to over rather than under-develop.

229. **Desired Amount of Bromide to Use.**— Bromide is used as a restrainer. The amount to use depends entirely upon how much the plate is over-exposed. By using a ten per cent. solution of bromide, the strength is such that a little more or less will do no harm; therefore, one can use bromide quite freely without any perceptible damage to the plates. After one becomes accustomed to restraining with bromide and after some experimenting with a few plates by first using, say, five or six drops, then if this is insufficient to restrain the plates properly, the next time try ten to fifteen drops. In this way one may soon be able to determine the necessary amount to use. The worker, therefore, should carefully note how much bromide he is using each time, and if the results prove that enough was used, or too much was used, govern himself accordingly the next time he develops an over-exposed plate.

230. **How Long a Plate Should Remain in the Bromide.**— Where plates are very much over-exposed, it is advisable to place them, previous to developing, in a bromide restraining bath, the strength of which depends upon how much in your judgment the plate is over-timed.

231. A fair rule to follow would be: If you consider a plate over-timed three times the normal exposure, then a bromide bath of, say, three ounces of water with one-half ounce of a ten per cent. solution of bromide added thereto, allowing the plate to remain in this bath for one minute, should be sufficient restraining. The plate should then be transferred immediately to a normal developer with one or two drops of bromide added thereto. The more the plate is over-timed the longer it should remain in the solution. If extremely over-timed then a stronger bromide solution should be used. Practice alone will teach you the exact amount of bromide to use, and the length of time the plate should remain in the restraining bath. Bear in mind that the immersing of the plate in a bromide solution previous to development is advisable only in cases of extreme over-exposure. Ordinary over-exposure can be restrained by developing in old developer, or by the addition of a few drops of bromide added to a normal developer.

232. **Yellow Negatives.**— Yellow negatives are generally caused from long development due to under or over-exposure. The developing of an under-exposed plate is always slow owing to the fact that a weak developer has been used, the emulsion on the plate is apt to become soft and this gives the pyro an opportunity to stain. The developing solution by the long development becomes discolored, therefore,

acts as a stain upon the film. This yellow stain, however, can be eliminated by immersing the plate or film in an alum solution. (See paragraph 270, Chapter X, NEGATIVE REDUCING, Part I.)

233. **Using Old Developer.**— When using old developer be sure and decant and filter the solution free of dirt or particles of film before use. The normal developer used for one developing should be your old developer for the next developing.

234. **Preserving Old Developer.**— For the preserving of old developer see paragraph 30, Chapter II, DRY PLATE DEVELOPING.

235. **Determining When to Check Development of a Plate Started in Normal Developer** — A plate should be transferred to the restraining bath — or in other words, the tray containing old developer — just as soon as you see the slightest signs of the shadows growing weak, fogging or veiling over. As stated before, the first few moments a plate is in the developer, it should be watched more carefully than at any other time. If you are developing several plates at a time, and one or more of them show signs of fogging in the shadows, transfer them at once to the old developer. Watch your plates closely and act quickly. Do not hesitate to transfer the plate to the tray of old developer if it shows the least sign of fog or flatness, for even should you be mistaken you cannot injure the plate by so doing.

236. **Clearing Stained Negatives.**— To remove the stain from negatives. (See Chapter X, NEGATIVE REDUCING.)

237. **Uneven Development.**— Uneven development — or plates with streaks in them — is generally caused by insufficient developing solution. It is also caused by not rocking the tray constantly during the development, or by allowing the plate to remain in the bromide solution, or in any restraining solution without agitating. A plate should never remain in any solution, no matter what it is, without being agitated and the solution kept constantly in motion. Too harsh rocking will give harsh, grainy effects. Rock gently sufficient to keep any sediment from settling on the plate.

238. **Mottled Negatives.**— This you can overcome by carefully rocking the tray during development. Sometimes this mottled appearance is visible on plates that have been reduced. This is caused by too strong a reducing solution, and not rocking the tray while the plate is reducing. Avoid too strong solutions of any kind.

239. **Large Transparent Spots.**— These spots are generally caused by adding bromide to the developer while the plates are in the tray. A drop of bromide falling upon a plate while developing, will restrain that portion of the plate which the bromide has penetrated, consequently, a round transparent spot will result. Streaks and spots will be the result if the plate were allowed to lie in the bromide solution without rocking the tray.

CAUTION.— Always rock or agitate all solutions while using them. Never allow a plate or film to remain in any solution without agitating.

SHEEP

Study No. 5, See Page 390

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CHAPTER IX.

ADVANCED DEVELOPMENT OF OVER-TIMED PLATES.

240. Most photographers have learned from experience that it is very essential to have sufficient time on all exposures. There are cases when in doubt as to the exact exposure necessary, and in order to be positive of the sufficient time, they expose a trifle longer than in their judgment they consider necessary, thus over-timing the plate.

241. Such a plate, if developed in normal developer to a finish, would be very dense, but flat. The prints from such plates would be anything but pleasing. With the proper manipulation, however, such plates can be made to yield very good prints. In fact, you can manipulate so as to overcome any reasonable amount of over-exposure, and thus save the negative.

242. Extreme over-exposure is not encouraged by any means; in fact, one should aim at the correct exposure at all times, for you cannot always produce as fine a quality plate by over-exposure as you can by correct exposure, no matter how much you doctor the plate. There are times, however, when plates are over-timed accidently, and these plates must be saved, and the very best possible results secured. To teach you how to do this is the purpose of this Instruction.

243. Over-exposing is more apt to occur in commercial photography than in portrait work. For instance, when making interiors, photographing machinery, furniture, stoves, draperies, etc., such work is usually photographed at the factory, and a large number of plates are exposed before return-

ing to the dark room to develop. As negatives made of all such objects must be fully timed you are apt to overtime. All negatives made under the same conditions are given practically the same exposure, therefore, if one plate is over-exposed all are. By developing one plate first you have a key to the rest, and can treat them accordingly.

244. Any reasonable amount of over-exposing can be overcome in the developing, provided you are aware that the plate is over-timed, and know pretty nearly how much, for then you can reduce the sensitometer back to that of a slower plate.

245. Note illustrations, Nos. 7 and 8. In No. 7 we have a plate with a two-second exposure, fully timed. No. 8 was given thirty seconds, or fourteen times more exposure than was necessary. In order to determine exactly how much the plate was over-timed, and to know how much the plate must be restrained, we developed plate No. 7 first. Finding this plate fully timed, we prepared to reduce the sensitometer of plate No. 8 before developing it, by placing in a bromide solution composed of: Water eight ounces, and ten per cent. bromide solution, two drams. We immersed the plate in this bath for four minutes, after which it was transferred to a normal developer with a few drops of bromide added. The results were as you see them in plate No. 8.

246. In all cases of extreme over-exposure, if you are aware that the plates are over-exposed, apply the above method. The longer the exposure, the more you must restrain the plate by immersing in a strong bromide bath.

247. When developing plates of unknown exposure, believing them to be over-exposed, always start either in old developer, or part old and part fresh. Or, if you have no old developer on hand, use normal developer with a few drops ten per cent. solution of bromide added. Place the plate in your normal developer, having a second tray containing a bromide bath made up as follows: To one-half-pint of water add two drams of a ten per cent. solution of bromide of potassium. As soon as the image appears on the plate, examine it, and if you find it flashing up quite quickly, as soon

Illustration No. 7
A Correct Exposure
See Paragraph No. 245

Illustration No. 8
Over-Exposure Corrected by
Proper Development
See Paragraph No. 245

as the shadows are developed, immediately place the plate in your second tray, containing bromide bath, and allow it to remain there for about four minutes, covering the tray to protect it from the light. The bromide at once acts upon the shadows, and restrains them from developing farther. After a few minutes, transfer the plate from the bromide solution to the normal developer.

248. You may find it necessary to make up a fresh normal developer to complete the developing. The strength of the bromide checking bath must be determined by the appearance of the plate when the image first appears. If the plate is only slightly over-timed, then dilute the bromide bath by adding double the amount of water.

249. Care must be taken when immersing the plate in bromide bath to be sure that the shadows are fully developed, for should you restrain the plate before all detail is developed, then your shadows will lack strength.

250. In cases of very slight over-exposure, we advise carrying the plate a little farther than usual in the normal developer, and then reduce the plate after fixing, with red prussiate of potash. (See Chapter X, REDUCING.) This solution will clear up the plate very nicely.

251. CAUTION:—If you had restrained the plate before securing full detail in shadows, when concluding the developing in normal developer, you would have found the shadows were developing very little, owing to the fact that the film was saturated with bromide. In order to secure further detail in the shadows you would have to soak the plate in plain water to eliminate bromide, and make a new developer weak in pyro, containing no bromide. That would give the detail producing chemical (carbonate of soda) a better opportunity to penetrate the film, and open the pores. This method will require the developing of the entire plate farther than ordinarily. Finally reduce the whole plate to the proper density with red prussiate.

252. A few points must be remembered when developing plates that are over-timed. First,—it is the shadows that are over-timed and, therefore, they must be treated, and

not the highlights. Second,—you must judge as near as possible by the first appearance of the image on the plate how much it is over-timed, and then restrain the shadows accordingly. Sometimes to simply immerse the plate in a weak bromide solution for only an instant will sufficiently restrain the shadows to supply the desired results.

253. Should the highlights alone appear too strong after the plate is developed and fixed, apply the persulphate of ammonia reducer (See paragraph 274, Instruction REDUCING), as it acts on the highlights only. Immerse the plate in this bath, and when the desired reduction is obtained place the plate in the sulphite of soda bath, and finally wash and dry.

254. Should you know in advance that the plate is very much over-timed, then reduce the sensitometer by immersing the plate in a bromide solution before it is developed.

255. **Portrait Work, Over-Exposed.**— In slight over-exposure of portraits, start the plate in half old and half fresh developer. This many times will sufficiently restrain the shadows. If this is not enough, you can immerse quickly the plate for only a second in a weak bromide solution of one dram ten per cent. solution of bromide to one-half-pint water. The longer you allow the plate to remain in the bromide bath, the more it will restrain. If the plate is over-exposed only a little more than you can control with the half old and half new developer, immerse the plate for a second in the bromide bath. If the plate is considerably over-timed, then allow it to remain longer in the bromide. You must be guided entirely by the appearance of the plate when in the first developer, as to how much to restrain it. You can restrain as little or as much as you require by this method.

256. In order to become familiar with the advantages of these methods of developing, make two over-timed exposures. Develop one plate in the normal developer; the other develop according to instructions for over-exposures. Make proofs from both plates, noting on backs of same developer used, and any other data that will aid you in your future developing. Save these proofs, filing in your proof file for future reference.

CHAPTER X.

GENERAL NEGATIVE REDUCING.

NOTE.—In the following lesson wherever the word "plate" is used "film" may be substituted.

257. There are times when, because of faulty exposure, one finds it necessary to over-develop the plate, thereby producing, in case of over-exposure, a negative which is too dense. While by the over-developing the required values of the highlights and shadows have been retained, yet the plate will be so dense that the printing from it would be very slow and unsatisfactory. In the case of under-exposure, the shadows having been insufficiently timed to supply detail, the development is prolonged in order to obtain all the detail possible in the shadows; consequently the highlights are over-developed, and are too dense. The result is too much contrast, the negative having only highlights and shadows, but no half-tones, and no gradation from the highlights to the shadows. Necessarily, negatives of either the above classes are slow printers.

258. In order to improve the printing quality of such plates, it is necessary to reduce them. Many negatives that would be considered worthless, and are often discarded, may be remodeled and doctored up to produce excellent prints. In fact, in many cases the very finest prints are produced from negatives that have been doctored; not only reduced, but intensified, in order to produce the proper gradation from the highlights to the shadows.

259. **Reducing Over-Developed Plates.**— As all negatives that have been over-developed should be reduced in order to produce the best printing quality, we will, therefore, consider the action of the reducing agent, of which there are a number of different kinds, although the action of all are practically the same. If a plate was placed under a microscope of high power so that the action of the reducer on the silver granules could be observed, you would find that the reducer was dissolving, or removing these small silver granules of which the image on the plate is composed. The longer the solution remained upon the plate the more it would reduce, and if the reducing agents were allowed to remain on the negative long enough the entire image would disappear. As this reduction, however, can be checked at any time by immersing or washing the plate in water, one has but to judge when the plate is reduced sufficiently.

260. **Red Prussiate of Potash Reducer.**— There are quite a number of formulæ for reducing. There are also prepared preparations on the market. We will, however, consider the two which are most generally used, and which we recommend. The first is ferricyanide (red prussiate of potash). The reducer acts evenly on the entire plate, and therefore the thinner portions (the shadows), are liable to disappear before there is much change on the dense parts (the highlights). For this reason we recommend red prussiate reducer for over-exposed and over-developed plates, which are not only slow printers, but lack in contrast.

261. **Persulphate Ammonia Reducer.**— The second reducer which is very successfully used is the persulphate of ammonia. This reducing agent will first attack the denser portions of the negative, as they are more susceptible to the action of the reducer. The thinner portions of the negative (the shadows), are only slightly affected, therefore, for a plate which is under-exposed; or a contrasty lighting; or an over-developed, under-timed plate; we recommend the use of persulphate of ammonia. It will act upon these strong highlights first, and when the highlights are reduced to their

proper stage there will be proper gradation from the highlight to the shadows.

262. **Action of Reducers.**—The persulphate of ammonia not only reduces the size of the silver granules, but also alters the character of the deposit. The granules become opalescent, reflecting a milky or pearly light, resulting in the required soft tones in the negative. With the red prussiate (ferricyanide), however, the silver granules after becoming reduced remain opaque. The action of the red prussiate is also much quicker than that of the persulphate.

263. **Use Discarded Plates, or Films, for Experimenting.**—As the successful performance of this work depends on the proper mixing of the chemicals in the required proportions, we advise for the first experiments the use of old discarded negatives. When able to produce the desired results on these discarded plates, make use of these same rules and formulæ in your regular work, and apply one of the above reducers whenever you feel that you can improve the negative, or negatives. The expert has these reducing chemicals always ready at hand in the dark room, and when his practiced eye sees the occasion for their use, on account of under or over-timed exposures, he immediately applies them and, by correcting their faults, obtains good negatives.

264. **The Best Time to Reduce Plates or Film.**—The best time to doctor negatives that are to be reduced with red prussiate, is immediately after fixing, while the negative is wet and most receptive. In case you are to reduce plates that have already been dried, or for the benefit of practice you are to reduce old or discarded plates, it will be necessary for you to place the plate first in the regular hypo bath for at least thirty minutes, so as to give the gelatine an opportunity to become thoroughly saturated with the hypo. If the plate is not thoroughly saturated with the hypo before the red prussiate touches it, it will produce stain, and the reducing will also be slow and uneven. When reducing with persulphate of ammonia, however, it is different. The reducing with this chemical is best done

when the plate is dry. It will act more quickly, and the reducer will attack the highlights more readily.

REDUCING STOCK SOLUTION, NO. 1.

265. **Formula for Reducing with Red Prussiate.—**

Red Prussiate of Potash (Ferricyanide)....	2 ounces
Water	4 ounces

You will find a little difficulty in dissolving all the crystals, but by constant shaking most of them will dissolve.

This Stock Solution must be kept in a well-stoppered bottle. A glass stoppered bottle is recommended. Wrap the bottle with black or yellow paper, and keep in a dark place, as strong daylight will affect this solution, and cause it to rapidly deteriorate. It is necessary that you observe the caution in regard to bottles for preserving your solution, and the manner in which it should be preserved. By doing this you will always be able to produce the best of results.

266. For use prepare as follows: To one ounce saturated solution hypo, add one-half-pint of water (eight ounces). Add to this about one dram of Stock Solution No. 1. To make a saturated solution of hypo, dissolve in a certain amount of water all of this chemical that the water can hold. When the chemical is dissolved in the water, the first portion added may disappear quickly enough, but as more is added, the dissolving proceeds more and more slowly until finally it ceases altogether, and some of the chemical failing to dissolve will sink to the bottom and remain there. The solution is then what is called saturated.

267. If upon applying the reducer to a plate you find that it does not reduce rapidly enough, add a little more of No. 1, and a proportionate amount of hypo, remembering that too little hypo will cause yellow negatives. Always bear in mind that the hypo is your color controlling chemical, and prevents the red prussiate from staining.

268. **Reducing the Plate.**—We will now suppose that you have your reducing solution prepared, and that you have

sufficient quantity. Never try to reduce with a small amount of solution, as the results will probably be uneven. Eight ounces of solution in a 5 x 7 tray is sufficient for a 4 x 5 or a 5 x 7 negative. Place your plate, or film, face up into the tray which contains the solution. Rock the tray gently, but never in one direction, as the negative will start reducing very quickly. Examine it frequently, and always rinse under the tap, or in clean water before examining. If you fail to rinse the plate it will keep on reducing while you are examining, and often times plates in this way are reduced too far. When it is finally reduced to the desired stage, where you have sufficient softness to the highlights, rinse it off under the tap for a few moments, and then place it back into the hypo for at least ten minutes. By placing back into the hypo the color of the plate is preserved.

269. **Plate Appearing Yellow.**—If the plate after reducing appears yellow, or at least a deeper color than you desire, you have not had sufficient hypo in the reducing bath. Sometimes the plate is yellow before reducing. In such cases you should not expect to change the color in this bath, as the reducing bath is not intended for clearing; in fact, it is more liable to increase the color. However, you may reduce the plate exactly the same as if you had the desired color, allowing for the changing of color. Then after fixing properly, and thoroughly washing the plate to eliminate all hypo, place it in the following clearing bath:—

270. **Clearing the Plate or Film.**—Dissolve four ounces of pulverized alum in one pint of water (sixteen oz.) Place this in a bottle, and label "Alum Stock Solution." Of this solution pour one-half-ounce into a tray, and add ten ozs. of water, and three drops of sulphuric acid C. P. Place your plate in the tray, and rock it freely. The color should disappear in a few minutes. If the bath works slowly, strengthen by adding more alum. When you secure the proper color remove the plate, and wash in plain running water for fifteen minutes, then place in the rack to dry. If you have no running water change the water on your plate about fifteen times. The sulphuric acid, even when combined with the alum, acts as a re-

ducer if used in excess quantities. Therefore, if not used cautiously it will reduce the strength of the plate, as well as clear it. If too strong an alum bath is used it will cause the film to pucker.

271. **Reducing Plates After They Are Dry.**—CAUTION:—Never try to reduce a plate until it is thoroughly fixed; to do so will produce a green color, and the plate is liable to reduce in spots. When reducing a plate that has been dried, it is a good plan to place it first in cool fresh water for a few minutes; then transfer the plate to the regular hypo bath, and allow it to remain about thirty minutes. Finally, without rinsing, place the plate in the reducing bath, rocking the tray gently. Never allow the solution to settle on the plate for a moment, or it will be streaked.

272. **Life of Reducing Solution, and How to Keep It.**—NOTE.—Red Prussiate of Potash, when mixed with hypo, decomposes very rapidly, and sometimes becomes worthless after immersing a half dozen plates. If more than this number are to be reduced, a new bath should be made up. The reducing should be done in the dark room by good, artificial light. A strong daylight is not advisable, as it affects the solution, and naturally shortens the life of the reducing chemicals.

273. **Judging Plates to be Reduced.**—By exercising judgment when to apply and use the reducer, you should never have a dense or slow printing negative. Frequently the true value of a negative is lost by slight over-development, and by training the eye to see this, and reducing the negative, it would be restored. This training is accomplished by close observation only, and by making mental notes. Try to impress on your memory the appearance of the plate before and after reducing, and in a very short time you will be able to judge just how far a plate should be reduced. You would then be able to judge correctly as to the printing quality, and development. If in doubt as to whether a plate would be improved by further reducing, allow it to dry, and make a proof print from it. If this proof prints slowly, and with too much harshness and contrast, again immerse the plate in the re-

ducer, and carry it to the proper stage. A plate that has once been reduced, and dried, will not reduce so rapidly the second time, even in a fresh reducing bath, and unless the solution is agitated carefully one may find the reducer to act in streaks. Therefore, avoid too strong a reducing for second immersion, and don't be annoyed if the reduction acts slowly, as the plate will be better for it.

PERSULPHATE OF AMMONIA REDUCER.

274. **Reducing with Persulphate of Ammonia.**—The persulphate of ammonia does not keep well when made in solution, and, therefore, it should be made up in small quantities, mixed for immediate use. This chemical, which is a most valuable addition to the stock of photographic materials, is less known and made use of less at the present time than its virtue would warrant. This is probably due, in part, to the want of knowledge of its properties, and the conflicting results that have been obtained with the first experiments. This, too, explains the reason for the various recommendations as to the strength the persulphate should be used at, which has varied in many instances from one to ten per cent. With a uniform preparation, however, the variations of results will be little or none, even when taking into consideration the different requirements of the amateur and professional. The amateur with fewer negatives to attend to, thinks nothing of spending a half-hour on a negative that he values, but on the other hand, the professional, whose time is money, would scarcely like to spend more than five or ten minutes on any plate. If longer time were required he might be tempted to leave the negative for a few minutes to attend to some other work, and probably forget it, and the nega-

tive in consequence would be spoiled by reducing too far. As there is nothing gained by the use of a very weak reducing agent, we recommend a method that will, on an average, require ten minutes to complete the necessary doctoring.

275. **Persulphate Reducer Grows Stronger with Age.**—The persulphate of ammonia from the moment that it is made into solution decomposes, and gradually becomes more and more acid. A good commercial sample of persulphate has a slightly acid action to start with, and this acid action rapidly increases when the persulphate is made into solution. A freshly made ten-per-cent. solution from C. P. persulphate has but a slight acid action, and can safely be used. This same solution, however, at the end of a week has a very strong acid action. A one-per-cent. solution at the lapse of a week acts more quickly than a fresh ten-per-cent. solution. Hence, our reason for using a fresh ten-per-cent. solution, and for making up only sufficient quantity for the plate, or number of plates, to be reduced. If the solution is made up of ordinary tap water, which usually contains chloride of carbonate, the action of the chemicals is quickly seen by the gathering of a milkiness on the surface of a negative. This is not the case if distilled water were used. It is, therefore, advisable to use ordinary tap water, as it acts as a guide. If old solution is used the reduced negative will assume a sickly sepia tint, and while the strong parts apparently are reduced, yet the color of the plate is such that the negative has not been improved for printing quality by the reduction.

276. From the above one will readily see that the persulphate is of uncertain action unless used fresh, and it is for this reason that we wish to impress on the worker's mind the necessity of using a fresh solution for each lot of plates to be reduced.

277. **Persulphate Formula.**—Formula for Persulphate of Ammonia Reducer:

Persulphate of Ammonia Crystals.....	50	grains.
Water.....	5	ounces.

If a larger bulk of solution is required, add ten grains persulphate of ammonia for every ounce of water.

REDUCING.

278. If a 5 x 7 plate is to be reduced, five ounces solution will be sufficient. If a number of plates are to be reduced, it is advisable to make up ten ounces of solution. This bath should be discarded as soon as you are through reducing, and if more plates are to be reduced later, a fresh bath should be prepared.

279. We will now suppose that you have placed your reducing solution in your tray. Take your negative without previously wetting, and place it in the solution. As we have said before, reducing with persulphate of ammonia is best accomplished when the plate is dry. The reducer will act with greater rapidity, and will attack the highlights more freely. Rock the tray gently. Examine the plate frequently, and when it is reduced to where you want it, you can stop the action of the reducer by first rinsing the plate in clear water, and then immersing it for about five minutes in a sulphite of soda solution, hydrometer test ten degrees. Or, dissolve one ounce of sulphite of soda in ten ounces of water. After soaking in this bath for a few minutes, wash in plain running water, and then place it in the rack to dry.

280. **Reducing Plates Hardened in Alum.**— The Persulphate Reducer will not act well upon plates that have been soaked, and hardened in alum. If you have plates which have been so treated, place them in plain water for ten minutes before applying the reducer. The soaking of the plates will soften the film, and open the pores, which have been closed by the action of the alum, the reducer will then act more freely.

281. **Traces of Hypo in Persulphate Bath.**— When using this reducer the negative must be freed from every trace of hypo. You are, therefore, cautioned upon the importance of using separate trays for different chemicals. If you have but one tray to use for reducing, you must see that it is thoroughly cleansed before using. For instance, should you have used the tray for reducing with red prussiate and hypo, and

only rinsed out the tray with plain water, sufficient hypo would still remain in the tray to contaminate the persulphate solution. In fact, the least trace of hypo would ruin a persulphate bath. Therefore, to insure good results, cleanse your tray thoroughly, and the best solution to use for cleansing the tray is one dram of sulphuric acid added to two ounces of water. Wash the tray thoroughly with this solution, and rinse with plain water. You may be sure that the hypo and other chemicals are then removed.

282. You are also cautioned when examining the plate which is being reduced, to rinse it off under the tap with plain water, before holding it up to the light, for if any of the solution remains upon the plate it is apt to run in streaks, and the reducing will continue, and thereby ruin the plate.

283. **Kind of Negatives to Reduce with Persulphate.**— Dense negatives resulting from over-exposure should not be treated in the persulphate ammonia bath, for in such a case you must reduce and clear the shadows as well as the highlights. The red prussiate of potash reducer is the best for such negatives. Dense negatives resulting from over-development of proper exposures, and from under-timed plates, that have been purposely over-developed in order to supply all the strength possible in the shadows, should be reduced in the persulphate ammonia bath. While the highlights alone are to be reduced, yet the entire plate is immersed in this bath, and the chemical action will be upon the highlights only. To apply a chemical that would act upon the shadows as well, would be ruinous; therefore, the persulphate should be used for reducing such plates.

284. In order to illustrate more clearly the advantage of the different reducing agents we present illustration No. 9 with only one-half of the plate treated with red prussiate reducer. If you will note this illustration No. 9, which was made from a negative that was over-exposed and over-developed, and then one-half of the plate reduced with red prussiate of potash, you will note the half which was not reduced shows but little of the image, and the part that was reduced gives a good strong print with clear shadows, soft highlights,

Illustration No. 9
Print from Over-Exposed and Over-Developed Negative,
One-Half of which is Reduced
See Paragraph No. 284

Illustrations Nos. 10 and 11
Before and After Reducing
See Paragraph No. 284

and good detail in both shadows and highlights. The reduced portion was completely printed in about fifteen minutes, while it would require hours to completely print the unreduced half and even then it would not produce as good a print as if reduced. In illustration No. 10, you will find the results produced by reducing with persulphate of ammonia. Here the plate had no more strength than was required in the shadows, but the highlights were too dense. The persulphate has acted upon these highlights alone, with the results as shown in illustration No. 11.

NATURE OF CHEMICALS USED FOR REDUCING NEGATIVES.

285. **Red Prussiate of Potash** (Ferricyanide).—Red prussiate crystals, when pulverized, become a yellow powder. Action, acid. Must be kept from the light and air as it will readily decompose. Dissolves slowly. Do not confuse with ferrocyanide, commonly called yellow prussiate of potash.

286. **Persulphate of Ammonia.**— White crystals or granular. Action, acid. Will decompose readily if allowed to remain in the air. Dissolves readily in water.

287. **Hypo-Sulphite.**— Commonly called hypo (thiosulphate of sodium). Put up in crystals and granular form. Colorless. Dissolves readily.

288. **Alum.**— White astringent mineral substance. Action, acid. Dissolves readily. Put up in crystals and pulverized form.

289. **Sulphite of Soda.**— Transparent crystals, also granular and dried, (anhydrous). Very soluble in water, two parts of crystal are equivalent to one part dried, (Anhydrous, or granular. Chemical action, neutral or slightly alkaline. Do not confuse sulphite with sulphate of soda.)

290. **Sulphuric Acid, C. P.**— Chemically pure. A colorless, oily liquid. Commercial sulphuric acid is yellow or

brown, and should never be used. CAUTION:—Never pour water into sulphuric acid, as this would be most liable to cause an explosion. Always pour the acid into the water. Coming in contact with the flesh it will burn. Do not confuse sulphuric acid with sulphurous acid.

MARINE

STUDY No. 6

S. I. CARPENTER

CHAPTER XI.

LOCAL REDUCING.

PLATES OR FILM.

291. Undoubtedly many negatives are made in which it is desirable that certain portions of the plate be made a trifle thinner, yet it would not do to sacrifice the whole plate for a few minor improvements. By careful application of the reducing solutions, whether it be the red prussiate or persulphate of ammonia, the portions of the plate which print too harsh can be subdued.

292. **Class of Negatives that Can Be Improved by Doctoring.**— In landscape, cloud effects, and interior work, this doctoring is invaluable, for in this way all halation and objectionable highlights can be subdued, or entirely elimi nated. In portraiture, for instance, where you have a red or tan faced subject gowned in white, there is apt to be great contrast, unless care has been taken in the lighting; even then, one when developing, in their endeavor to build up the face as strong as possible so it will not print black, is very apt to over-develop the drapery. Then, again, a white bow in the hair, a blue ribbon, etc., may develop very strong, and give chalky results. It also happens very often that the plate is under-exposed, and in forcing the detail in the shadows, the highlights become too dense. All these objections can be removed, and the negative very much improved by local reduction.

293. **Doctoring White Drapery.**— Great care must be exercised, else you overdo, or spoil the plate; still these methods are successfully employed every day, and practice will make you perfect. Sometimes in large groups there may be but one or two subjects in white drapery, and the rest are all in dark; usually the white gown is developed a trifle stronger than you would like, and, consequently, the white drapery prints chalky, compared to the others. In such cases it is necessary that only these white draperies be reduced. By careful application of the reducing solution one can improve many faults in any negative, even with entire groups of subjects all gowned in white, such as bridal parties, graduating classes, or even single subjects dressed in white. Where the delicate trimming of lace, etc., is sometimes lost, and there is little or no detail in any part of the drapery, one can by careful application reduce the harshness and supply detail. Where the dress is arranged in folds one can accent the shadows more or less by applying the reducer to these parts.

294. In PART FIRST, of NEGATIVE REDUCING, we described, in paragraph 260, the class of plates that should be reduced with red prussiate of potash. In preparing this Instruction, reducing portions of the plate only where it will do no harm to reduce the shadows a trifle also, it is advisable to use the red prussiate, and your first experiments should be with such a negative. After soaking the negative in the hypo bath for ten minutes, apply with a soft camel's-hair brush the diluted solution of red prussiate of potash to all parts that need reducing.

295. **Strength of Solution to Use.**—The reducing solution must be used diluted, because the action of the solution begins on the surface of the film, and works its way through, and, if too strong, in all probability would dissolve away some of the shadow details before accomplishing the required reduction in the denser parts of the negative. Too strong a solution will also work too rapidly for even reducing, and one is almost sure to produce blotches and spots, instead of gradually blended results. Great care must be exercised lest you touch other parts of the negative, which do not require

reducing. A good plan is to pour into a saucer a small quantity of the reducing solution, made according to instructions (see paragraph 265, PART I), diluting the solution by adding an equal amount of water. Dip the brush into this solution, and squeeze out the overflow of the brush on the edge of the saucer so that there will be but a trifle remaining on the tip of the brush.

296. **Applying the Reducer with the Brush.**— Hold the plate to the light so that you can see through it. If possible, have the light lower than the plate so that you can hold the plate almost flat when applying the solution. Before applying the solution, however, mop the surplus water from the surface of the plate with a tuft of cotton, or with the ball of the hand. This will prevent the solution from spreading. When applying the reducer do not allow it to touch any other portion except the parts to be reduced, and allow the solution to remain on the plate only a few moments at a time. After each application rinse off with water, thereby avoiding the spread of the reducing solution, and the danger of reducing too fast. Examine the plates carefully after each application. After you have applied the weak diluted solution a number of times, and have not obtained the desired result, apply a stronger one, working very carefully. It is safer to work slowly, as your results in the end will be much better, and there will be less danger of reducing parts that should not have been reduced.

297. **Use Running Water to Check Reduction.**— Always have running water from the faucet flow over the plate as soon as the reduction is carried far enough. This necessarily requires very quick action on the part of the operator, or the solution will be left a second too long, and the reduction carried too far.

298. **Avoid Granular Surface by Returning the Plate to the Hypo Bath.**— After the parts are reduced to your satisfaction, rinse the plate for a moment under the faucet, and then replace in the hypo bath for ten minutes. This will insure a good color to the plate, and will produce a smooth surface instead of a granular effect, which would be the

result if the plate were not returned to the hypo bath after the red prussiate had been applied.

299. **Applying the Reducer with the Finger, or Tuft of Cotton.**— Another very good plan, especially where you are reducing white drapery, is to apply the solution with the finger, dipping it in the solution and rubbing the parts to be reduced. Here again it is necessary to guard against rubbing these portions too hard. You should have running water during the process, so that you can quickly place the plate under the faucet after each application. For very delicate work, however, we advise using a No. 2 camel's hair brush; for heavier work you can apply the solution with the fingers, or tuft of cotton. In this way you can reduce strong highlights on the face, hair and drapery, but you must be exceptionally careful when applying the solution to the face that you do not overdo the work. When using the finger rub lightly or heavily, as may be required, but always bear in mind that it will not do to rub too hard. The sense of the touch will aid you in judging the amount of the reducing you are doing, as the film not only becomes thinner to look through, but really reduces in thickness. The sense of touch serves as a very good guide to prevent you from overdoing the reduction, or injuring the film by hard rubbing.

300. There are times when one would like to blend the drapery from the strongest highlights to total black shadows. This can be accomplished very nicely by applying the solution very lightly to the strongest lights, and gradually heavier to the parts requiring more reduction. A tuft of cotton is best for this work, as the reducer must be spread more broadly. While the majority of the reduction is in the lower portion of the plate one must occasionally swab, very lightly, the upper portions, rubbing heavier as you approach the lower parts, so as to gradually blend them. This blending will require considerable practice to do the work nicely, but when one gets the knack of doing it any desired result can be obtained. If the parts you wish to reduce are very strong, and the reducer does not take hold properly, use a double strength solution. When using the double strength solution hold the plate per-

pendicular, and apply to the lower parts, first blending upward. The reducer will then run over the parts to be reduced the most, and by constantly swabbing with the cotton, streaks will be avoided.

301. **Reducing Plates After They Have Dried.**— When the plate is dry, and you wish to locally reduce it, it is necessary to first place the plate in plain cool water for ten minutes. This softens the film, and opens the pores. Then transfer to the regular hypo bath, and allow to remain for ten minutes more, so that the pores of the film being open allow the hypo to penetrate quickly, thereby avoiding stain and spots, as would be the case had all the film not been evenly saturated with hypo.

302. After the plate is sufficiently soaked in hypo, it is advisable to immerse the entire plate in a very weak solution of reducer for only a moment (just enough to slightly stain the film). Then rinse with plain water, and apply the solution locally, as you require. Finally, when you have doctored the plate to your entire satisfaction, again immerse the entire plate in the reducing solution for a moment, after which rinse off quickly. Then place it again in the hypo bath for ten minutes, and finally wash for fifteen minutes in running water. If the negative requires much doctoring, the reducer may slightly discolor the reduced portions. If this should occur after the plate is thoroughly washed immerse it in the clearing bath. (See paragraph 270 of PART I.)

303. **Reducing with Persulphate.**— While most local reducing can be accomplished with red prussiate bath, yet, some workers prefer the persulphate for certain class of plates. In treating with the persulphate reducer, PART I, of this Instruction, you were told that the persulphate has a tendency to reduce the highlights without effecting the shadows; therefore, this reducer should be used only on plates where the shadows are already thin enough. Prepare your persulphate of ammonia reducer according to instructions in paragraph 277, PART I. Remember that it is necessary when using this reducer that the negative be absolutely free from every

trace of hypo. The application of the solution is exactly the same as that of the red prussiate. After you have reduced portions of the plate as much as you desire, rinse the entire plate in water. Then place it in sulphite of soda bath (see paragraph 279, PART I), after which wash in plain running water, and place in rack to dry.

304. **Applying the Reducer to Films.**— The application of the local reducing solution applies to films as well as plates. Both are reduced exactly alike. When applying the red prussiate locally to film, in order to hold the film perfectly flat, lay it on a piece of plain glass which has previously been wet in cold water. The surplus water on the glass and film will hold the film perfectly flat, while you are applying the reducer. If the film is of the curling kind, it will not lay flat by the above method. With ordinary tacks fasten the four corners to either a card board, or a small pine board, which has previously been thoroughly soaked in clear water, and while wet tack on the film.

305. If the persulphate reducer is used, it should be applied to the film while dry. In event of the film curling, the board to which it is attached must be dry and not wet. As any results produced by persulphate can be obtained with the red prussiate and many more effects that cannot be produced by persulphate can be obtained with the red prussiate, which is easily prepared, and much simpler to manipulate than the persulphate, it is advisable to use red prussiate for all local reducing.

306. While the best time to reduce or doctor a negative with red prussiate is while it is wet, or as soon as possible after the plate is developed and fixed, yet it is advisable, for experimental purposes, to use old or discarded plates or films. These being dry must be treated according to instructions before reducing. After one has become experienced in the manipulating of the reducer locally, it should be applied on all negatives requiring local reduction immediately after the plate is developed, and thoroughly fixed.

DIFFICULTIES — REDUCING.

DIFFICULTIES MET WITH IN REDUCING WITH RED PRUSSIATE OF POTASH.

307. **Negative Reducing too Slowly.**— Plates or films which have been fixed in a bath containing alum, acid, or any hardening chemical, are apt to reduce slowly, and at times not at all. Plates which have been dried a long time will reduce slowly unless the film on the plate is thoroughly softened, and this is done by first placing in water for ten minutes and then transferring to the hypo bath for half an hour. It is also necessary at times to strengthen the reducing solution by adding reducing agent. If too much hypo bath was used the reducing agent would act slowly, as the hypo would overpower and weaken the reducing agent.

308. **Negatives Reducing too Quickly.**— If the reducing solution acts too quickly, it is because the reducing agent used is too strong. *Remedy:* Add more hypo solution.

309. **Negatives Will not Reduce.**— If the negatives will not reduce place in fresh water for one-half an hour, then into the regular fixing bath for another half-hour, and reduce with double strength reducing solution. Use twice the amount red prussiate solution to the regular amount of hypo.

310. **Reducing Shadows too Much.**— If the shadows in the negative are reducing too much you should use the persulphate of ammonia reducer. Only by careful manipulation, however, can you reduce the highlights alone with red prussiate reducer. Apply carefully to the parts of the negative which need reducing. Do not allow any of the reducing agent to touch the shadows.

311. **Negatives Stained a Reddish-Yellow After Reducing.**— If the plate, or film, is stained a reddish-yellow after reducing it is because the negative was not perfectly fixed before reducing. It was not allowed to remain in the hypo long enough to remove all the silver from the plate. If the reducer is applied before the silver is entirely eliminated it will cause a stain which is almost impossible to remove. However, the clearing bath (formula for which is given in paragraph 270, PART I, NEGATIVE REDUCING) will generally improve the color.

312. **Negatives Streaked After Reducing.**— If the negatives have a streaky appearance after reducing, it is because they were allowed to remain in the reducing solution without agitating — rocking the tray — or if the plate is not thoroughly fixed before reducing it is apt to reduce in streaks. *Remedy:* Always fix plates, or film, ten minutes after the silver, or white, has disappeared, and carefully rock the tray while the plate is being reduced.

When applying the reducing solution locally, unless great care is exercised the reducing agent is liable to run on the plate and this would cause streaks. *Remedy:* When applying locally place the plate flat in a horizontal position, allowing the solution to remain on the plate for only an instant at a time, and rinse under the tap after every application, and before examining.

313. **Negatives Yellow After Reducing.**— If the plate is yellow after reducing it may have been slightly yellow before reducing, and the reducing will make this yellow stain a trifle darker. If the reducing agent is too strong, or the hypo too weak, reducing is apt to stain the plate. Generally the alum clearing solution will remove this stain.

314. **Removing Yellow Stain from Negatives After Reducing.**— If you find that the clearing bath will not act readily, add a little more alum and sulphuric acid. Sometimes, however, one may have added too much acid to properly balance the bath. In such a case the addition of more alum only to the bath already prepared, will at once start the plate to clearing. Care must be exercised when adding more alum or acid. Too much alum will pucker the film, and too much acid will reduce the plate. Therefore, add only a little alum at a time, and only a drop or so of acid. Use only chemically pure acid, and ground alum.

315. **Surface of the Plate Puckering After Going through Clearing Solution.**— If the surface of the plate has a shriveled-up appearance, it is because the clearing solution contained too much alum, and the strong alum puckered the film. Very little can be done to remedy this. Sometimes soaking in a fairly strong solution of carbonate of soda, and then washing thoroughly, will bring the film back to its proper form.

316. **Negatives Reducing in Clearing Solution.**— If the negative continues to reduce in the clearing solution, it is because the clearing bath contained too much sulphuric acid. When you first place a plate in the clearing solution allow it to remain for a moment only, and then rinse it under the tap before examining. If you find that the clearing bath is reducing the plate add more water before you place the negative back in the solution.

DIFFICULTIES MET WITH IN REDUCING WITH PERSULPHATE OF AMMONIA.

317. **Persulphate of Ammonia not Reducing.**— If the persulphate of ammonia bath is prepared properly, and is of good quality, it reduces. If it acts slowly strengthen by adding more persulphate. (See paragraph 277, PART I.)

318. **Persulphate of Ammonia Bath Reducing too Quickly.**— If the persulphate of ammonia reducer acts too quickly, it is because the solution is too strong. (See paragraph 275, PART I, NEGATIVE REDUCING.) Always make up the bath just before you are going to use it.

319. **Parts of the Negatives Reduced with Persulphate Stained.**— If parts of the negatives which have been reduced are stained, place the plates in the clearing bath composed of alum and sulphuric acid. Previous to this, however, the plates should have gone through the sulphite checking bath. Be sure that the negatives are properly fixed and washed, and there will be no stain after reducing.

320. **Plates Very Glossy After Reducing.**— All plates will appear rather glossy after reducing, and are, therefore, harder to retouch and etch. The cause of this glossy appearance is that the reducing solution acts on the top of the film, and actually cuts away a portion of this film. At the same time it acts as an astringent, and draws the little globules of gelatine together, thus causing the hard, shiny surface. This can be overcome to a certain extent by soaking the plate for a few minutes in a carbonate of soda bath, about sixty hydrometer test. This will open the pores, and there will be very little gloss.

321. **Confining Solution to Only the Parts to be Reduced.**—To avoid reducing other parts than those you desire reduced, mop the surplus water from the parts to be reduced. The solution will then attack the film quickly. Work carefully, applying only a little reducer, allowing it to remain on the parts to be reduced for only an instant at a time. Rinse after each application, and do not use too strong a solution. It is necessary that you act quickly. You must think and act at the same time. Practice, and practice only, will enable you to overcome this difficulty.

CHAPTER XII.

UNIVERSAL DEVELOPING.

322. In our previous Instruction on ORDINARY DEVELOPING we dealt principally with the use of necessary chemicals, and the manipulation of the different solutions in order to produce certain results. The formula for developing, given in this instruction, is intended for all classes of work, and should be universally employed for general portrait or commercial photography.

323. After numerous experiments with the formulæ and instructions given in former lessons, you should have a fair understanding of the use of the different chemicals employed, and the advantage of altering the quantities of chemicals in the different solutions, from time to time, to suit the plate you are developing. Further, you should be advanced sufficiently to appreciate the advantage of the formula given in this instruction for rapid development of all classes of exposure, with little or no change of the developer, and yet produce the very best of results.

324. The simplest formula that one can employ, and yet obtain good results is always the surest and best. By applying the formula given in this instruction to all your future general work you will produce very uniform negatives, and with the slight altering from time to time to suit local water conditions every obstacle can be overcome.

325. You should profit, of course, by your previous experience with ORDINARY DEVELOPING, and by applying the same method with the formula called for in this instruction superior results will be secured. This formula you will notice

is divided into four solutions, the principal object of which is to have your normal developing agent (pyro) ripen in solution before using. If you were to prepare a gold bath for toning prints and use it immediately, without permitting it to set and become thoroughly mixed with the water, thus ripening the bath, it would work harsh and bleach the highlights in the prints; whereas, by allowing the gold and alkali to mix gradually with the water, and become thoroughly ripened, the bath works more evenly and smoothly, producing greater roundness, and a much more delicate effect. As it is with the toning bath so it is with the developing solutions.

326. If your developing agent is mixed from a concentrated stock solution directly with the accelerators of a less strength and then still diluted with water and immediately used for developing, the strongest chemical will attack the sensitized plate first. In this case the strongest chemical being your developing agent (pyro), the highlights are attacked, and if the plate is fully-timed the plate has lost its roundness before the accelerators have been sufficiently mixed with the pyro to supply the required softness. Thus, many times, plates that are really properly exposed, develop as though they were over-timed, and the same is true of under-exposures. The strongest chemical (pyro), attacks the highlights, and clogs the shadows before the alkali, or accelerator, has an opportunity to soften and open the pores of the film sufficiently to permit the developing agent to build them up, and assist in supplying detail.

327. This obstacle is overcome by permitting the developing agent (pyro), as well as the accelerator, to ripen before using. This you do by preparing your developer in four solutions and reducing the concentrated pyro stock solution to the strength required, ready for use, which proportions are equal to those of the sulphite and carbonate to supply a properly balanced developer. Each solution being prepared for some time in advance, all are well ripened, ready for immediate use, without adding water to the developer until just before using. If water is added at all it affects all the three

chemicals alike, as all are diluted to their proper proportions, and are perfectly balanced.

UNIVERSAL DEVELOPING FORMULA.

328. Prepare your developer as follows:—

STOCK SOLUTION, NO. 1.

Water	6 ounces
Sulphuric Acid, C. P.	½ dram
Pyro	1 ounce

NOTE.— If softer results are desired use water twelve ounces in place of six, the other stock solutions remaining as they are, as the object is to change the strength of the pyro only.

Mix these chemicals in the order given. Add the acid gradually to the water. Never add the water to the sulphuric acid. By adding the pyro last you avoid early discoloration of this stock solution.

329. The sulphuric acid, used in Stock Solution No. 1, will preserve the solution from discoloring, and it also has a tendency to retard the development, and will hold the shadows clear and free from fog — sulphuric acid contains a fraction over ninety-two per cent. pure acid and, therefore, must not be used in excess quantities. Nitric acid may be substituted, if one so desires, but as the latter contains only sixty-eight per cent. pure acid, one dram should be used in place of a half dram of the sulphuric. As nitric acid has less retarding qualities (being a weaker acid), it is recommended for slow developers. As this formula is for a rapid developer, we recommend sulphuric acid.

STOCK SOLUTION NO. 2.

330. Procure a thirty-six-ounce bottle. Into this pour two ounces of Solution No. 1, and add thirty-two ounces of water.

STOCK SOLUTION NO. 3.

Sulphite of Soda, 40 hydrometer test, or by weight,

Sulphite of Soda (anhydrous)	1 ounce
Water	13 ounces

STOCK SOLUTION No. 4.

Carbonate of Soda, 20 Hydrometer test, or if by weight,
Carbonate of Soda (anhydrous)..... 1 ounce
Water..... 23 ounces

If soda crystals are used you will require double the weight.

331. Use only the very best of chemicals. We would recommend anhydrous sodas C. P., and advise hydrometer test in preference to weight. Prepare all stock solutions in the order given.

DIRECTIONS FOR USING.

332. Take of Solution No. 2, four ounces; of Stock Solution No. 3, two ounces; of Stock Solution No. 4, two ounces, —making eight ounces of solution. Before using pour this combined solution back and forth from the graduate to a clean tray, to thoroughly mix all of the chemicals. After placing the plate in the tray, pour the solution over the plate, and be sure to cover the entire plate with one sweep, as the action of this developer is so rapid that unless all parts of the plate are covered with the first sweep, there will likely be streaks and lines in the completely developed negative.

333. When making an exposure, whether portrait, landscape, interior or exterior, you must at all times expose for the shadows; that is, you must give sufficient exposure to supply the required detail in the shadows, but when developing the plate you must develop for the highlights, making due allowance for fixing.

334. You will find with this developer the plate, if properly exposed, will develop quickly, and the image will grow gradually. The shadows will develop along with their proper relations to the highlights, and when the latter are developed to the point you desire, your shadows will be crisp and round, with plenty of detail.

335. The color of the plate is governed by the strength of the sulphite. Water is subject to several chemical changes during the year. Usually in the spring the water becomes

infected with more or less vegetable matter, and there are other times when the water becomes more alkali than usual. You will realize this when your plates, after washing, are of a more or less yellow color—there being more alkali in the developer than enough to balance the developer. If the plate becomes too yellow you should increase the strength of the sulphite; if the plate becomes too gray reduce the strength of the sulphite. Allow the carbonate of soda to remain 20 Hydrometer test always, and regulate the color entirely by increasing or reducing the strength of the sulphite.

336. For Seeds, Stanley and Standard plates use the developer according to this formula. For Hammer plates use three ounces of No. 2 (pyro) in place of four ounces, and add one ounce of water to the developer. For Cramer plates use five ounces of No. 2 (pyro), in place of four ounces, and add one ounce of water to the developer.

337. From the fact that Seeds plates are very heavily coated, they must be carried farther in the developer than other plates. The reason you use less pyro for Hammer plates is that they are thinner coated, and work with greater contrast, consequently, to obtain soft effects they do not need the same amount of pyro, nor as strong contrast in the lighting of the subject as the other brands which are thicker coated, in which the contrast must be built up. Pyro is a contrast producer in developing. The emulsion of Cramer plates is such that it requires a little more pyro to give the desired contrast on this brand of plate. By adjusting the developer, according to formula, and instructions given herein, you can obtain every quality that exists in any brand of plates.

IMPORTANT NOTES.

338. With this developer, working as it does quite rapidly, care must be exercised that you do not over-develop. Examine the plate frequently. It is a good plan to provide yourself with a washing tank; fill it with water, and when you judge a plate very nearly developed, place it in the tank

of water, and allow it to remain for fifteen minutes. If you have other plates to develop, proceed and develop all you have, but place them all in the tank of water for a short while before transferring into the fixing bath. You will be surprised to discover how much the plate will develop in the water, and the developing will not be harsh, but soft, mellow and round. The half-tones will be full of detail—the shadows crisp and snappy.

339. In case of a plate lagging in the developer, indicating under-exposure, place it in the tank of water for ten minutes at a time, then return it to the developer for a while, and if it still appears weak, again return it to the tank of water. The temperature of the water should be about sixty-five degrees. Many times a considerably under-timed plate can be treated in this way, and a splendid negative made of it.

340. In case of over-exposure — the plate flashing up quite quickly — it is advisable to provide yourself with a tray of water containing several drops of bromide, and place the plate in this solution for five minutes. This will restrain the shadows, and when returned to the normal developer the plate will develop evenly and round up, becoming more crisp as it continues developing. In case the plate was very much over-timed, and not checked soon enough, then you will need to develop quite dense, and finally reduce with red prussiate reducer. For formula, see instruction on REDUCING. Negatives that are just a little dense, and perhaps a trifle hazy, can be greatly improved— the shadows cleared and strengthened — by immersing the negative, after thorough fixing, for a few minutes in a weak red prussiate of potash reducing solution.

341. Another pyro formula which may be used for exceedingly soft effects :—

STOCK SOLUTION NO. 1.

Water	16 ounces
Sulphuric Acid	10 drops
Pyro	1 ounce

"SNOW LIGHTS"
Hung at Fourth American Salon

STUDY No. 7, See Page 370

GEO. H. SCHEER, M. D.,
SHEBOYGAN, WIS.

Stock Solution No. 2.

Sulphite Soda, 60 hydrometer test, or, if by weight,
Sulphite Soda (Anhydrous)..... 2 ounces
Water ..... 18 ounces

Stock Solution No. 3.

Carbonate Soda, 50 hydrometer test, or, if by weight,
Carbonate Soda..... 2 ounces
Water ..... 18 ounces

For use take,

No. 1..... 1 ounce
No. 2..... 1 ounce
No. 3..... 1 ounce
Water ..... 16 ounces

The temperature of all solutions should be as near normal as possible, sixty-five to seventy degrees Fahr.

ALUM HYPO BATH.

In warm weather, or warm climates, the following alum fixing bath may be used in place of the plain hypo and water:—

A Water ..... 96 ounces
Hypo..... 2 pounds

B Sulphite Soda (Anhydrous), 4 ounces, or, if in crystals, double the amount.
Powdered Alum ..... 6 ounces
Citric Acid..... 1 ounce
Water ..... 64 ounces

When both solutions are thoroughly dissolved, pour *B* into *A* slowly, while stirring rapidly.

DIFFICULTIES — UNIVERSAL DEVELOPING.

342. **Developing Heavy Shadow Lightings.**— In developing shadow lightings, in portraits or views containing dense shadows requiring detail, you must strive for clearness of the shadows, and softness of the highlights. This is controlled before development by the amount of developing agent that you are using. If you find the highlights building up strong — becoming dense, practically no half-tones showing in them — reduce the strength of your developer by adding water. Oftentimes if the exposure is short, place your negative in a tray of fresh water. If the negative is very much under-timed prepare a new developer, using one-half the amount of the developing agent (pyro), the regular amount of carbonate and sulphite, and double the amount of water. Generally this formula for universal developing, if the lighting and exposure have been anywhere near correct, will develop properly without altering.

343. **Developer Discoloring After Having Been Prepared Only a Short Time.**— If the water you are using in your pyro stock solution is strongly alkali, it will cause your stock solution to discolor quickly, and it might be necessary to acidify the water, neutralizing it, before preparing this stock solution. This you can do by adding a few drops of sulphuric acid. But first test the water with blue and red litmus paper. If the water turns the red litmus paper blue, you will know that it is strongly alkali. If, however, it does not change the color of either litmus papers, you will know it is neutral. If the water does turn the red litmus paper blue, then you will need to acidify it by adding a drop at a time of sulphuric acid until it becomes neutral.

344. When you have neutralized the water, then add in addition the amount of acid given in the formula; finally add your pyro. Keep your pyro stock solution in a tightly corked bottle, if possible, a brown or yellow bottle, and store in a dark, cool place. When you are preparing for developing, first pour your pyro solution in the graduate, next add your sulphite, then your carbonate. All stock solutions should be shaken before using, especially the pyro stock solutions, (so as to keep the acid thoroughly mixed with the pyro.) If your stock solution does not discolor rapidly there is no necessity for neutralizing the water.

345. **Negatives Drying with a Coarse Grain.** — This is sometimes due to the carbonate of soda being too strong, or prolonged development, or if the negative is gray and grainy your sulphite is also too strong. Reduce the strength.

346. **Shadows Fogging During Development.**— This trouble is generally found in under-exposures where you had altered the developer by reducing the amount of pyro, thereby producing a developer too

strong in sodas, both sulphite and carbonate, more especially, however, carbonate. The latter if used in excess of a sufficient amount to nicely balance the developer is sure to fog the shadows. Extreme under-exposure requiring prolonged development is also apt to fog the shadows. In such cases immerse the entire plate after fixing in a weak red prussiate reducing solution. This will clear it.

347. **Negatives too Strong in Color — Yellow.**— Either your sulphite of soda solution has deteriorated by becoming old, or it is not strong enough. Sometimes sulphite of soda solution that has been made up for a considerable length of time, while it may test the same strength, has lost the chemical action necessary to prevent the pyro from staining the plate. Discard this sulphite, and make up a new solution. The amateur who only develops occasionally should make up small stock solutions. Both sodas should be kept in tightly corked bottles. Yellow color may be removed from negatives by immersing in alum clearing bath. See formula in Instruction on REDUCING.

348. **Testing Old Sulphite of Soda Solution.**—Place a small quantity of your pyro solution in your graduate; next add a small quantity of sulphite, then add the same quantity of carbonate. If your developer turns dark, and refuses to clear up, as it should if the sulphite was fresh, you may be certain that the sulphite is too old and deteriorated. In making this test, use the same proportions that you would in preparing your developer for developing.

349. **Negatives which Appeared Sufficiently Developed, Very Thin After Fixing.**— If your negative is of a scene with heavy shadows, or a portrait of Rembrandt Lighting, the negative should be thin, and while it may appear too thin you will find that it has sufficient strength for good printing quality. If the highlights of the negative are very thin it may be possible that you are under-developing; therefore, you must experiment. Carry the developing a trifle further, and then watch your resulting prints.

350. **Proper Detail in Shadows.**— While this is governed greatly by the lighting, the detail in the shadows is often lost in the developing, and in the improper preparation of the developer, or from not handling the negative correctly during development. If you find that the highlights are building up strong, it is possibly due to the fact that your lighting was contrasty, or you under-exposed the plate. It is, therefore, necessary that the strength of the developer should be reduced and this you can do by adding water to the developer, thus treating the plate as under-exposed.

351. **Plate Inclined to Develop Contrasty.**— This difficulty is generally caused by either contrasty lighting, or under-exposure. Treating the plate for under-exposure during development — weakening the developer — will enable you to produce softer highlights, and, therefore, at the same time build up the shadows, and produce less contrast.

352. **Securing Half-Tones in Highlights.**— If the lighting is con-

trasty, even though the plate is fully exposed, the highlights will develop up exactly as they are lighted, and you lose practically all the detail. This is not the fault of the developer, but of the lighting. Subdue your lighting. You can improve a contrasty lighting *in the developer* by reducing the strength of your developer — adding water. This will give the shadows a chance to build up, and at the same time prevent the highlights from becoming dense, and will enable you to produce detail and half-tones.

353. **Plate Developing Flat.**— In portraiture this is due to flat lighting, or over-exposure. If the plate develops up very flat and your subject was properly lighted, and the plate properly exposed, it is because you have diluted your developer. Use a normal, full strength developer. If your plate is over-exposed, treat as such in development, and you will overcome this flatness, and produce more contrast. (See Instruction, DEVELOPING OVER-EXPOSURES.)

354. **No Detail in Highlights.**— This is due either to contrasty lighting, or over-development. Watch your plate carefully during development, and make the changes necessary in the developer to control detail in highlights. If the plate is over-exposed, add bromide, or place the plate in old developer. If it is a contrasty lighting, plate exposed about right, reduce the strength of the developer, by adding water.

355. Oftentimes it is a good plan, in this case, to place the plate directly into a tray of fresh water, and allow it to remain five or ten minutes, and then return the plate to a developer which should be only about half as strong as the developer you had been using, and you can reduce the strength by adding water. If the lighting and exposure are correct, and the highlights clog up so that there is no detail, this will indicate that your developer is too strong. Immediately reduce it by doubling the quantity of water. One should always strive to have the lightings correct, and never depend on altering the lightings in the developing.

356. **Retaining Soft Detail in Shadow.**— In case of contrasty lightings developing hard, and you are unable to produce the desired softness by manipulation, you should over-develop and after thoroughly fixing the negative reduce the entire plate until the highlights appear sufficiently soft, with sufficient strength, however, to give snap and brilliancy. The after reducing will also apply to plates that were properly lighted, but over-developed. By being careful not to allow your highlights to build up too strong, you will produce soft detail in the shadows. Too strong a developer will produce strong highlights and transparent shadows. Dilute the developer in order to secure softness. Under-exposure would produce strong highlights, and deep shadows. Dilute the developer with water. Over-exposure would produce dense highlights and flat foggy shadows. Over-develop and reduce with red prussiate.

CHAPTER XIII.

SPECIAL PYRO DEVELOPING FOR COMMERCIAL PHOTOGRAPHY.

357. By employing the methods for developing given in this instruction, one can overcome many obstacles, and produce successful photographs which, with ordinary developing, would be impossible.

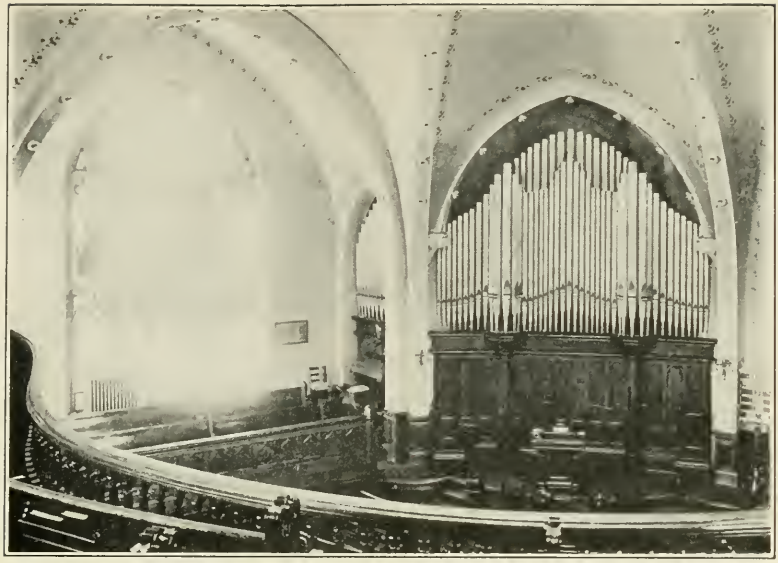
358. Exposures under conditions which would ordinarily be considered impossible, can be obtained, and good negatives produced by the method of special development. In PART I of this instruction we will treat with COMMERCIAL PHOTOGRAPHY entirely. When making general exterior views, how often do we see pictures of scenes where, under a high sun, foliage and mountain tops are drowned into harshness, or even flatness, without any attempt at preserving the atmospheric effects visible. The haze in the distance, which is most beautiful to the eye, is lost entirely in the picture. Why? Because no special effort has been made to retain it. The hills instead of showing feeling and care are hard as stone. The haze is mere fog without atmosphere. All the most beautiful effects that are true to nature can be preserved, and it is these effects that make the picture interesting, and it is the object of this instruction to teach you how to retain them in every exterior that is out of the ordinary, and beyond this means of preservation with ordinary developing.

359. In interior photography we find many instances where it would seem absolutely impossible to obtain satisfactory reproductions of the view as it appears to the human eye. For instance, photographing interiors of churches with windows glazed with pictured glass which adds so much to the appearance of the structure. There may be light walls with dark trimmings, old mission pews, or they may be to the other extreme, all finished in white enamel and white marble, which make them still more difficult to reproduce photographically.

360. The photographing of the beautiful stained windows in clear detail, and at the same time retaining all the values of the dark trimmings, furniture, etc., seems difficult. Usually with non-halation plates one can produce fair results, yet there is always something lacking. The picture has not the snap, for while the halation from the light entering through the windows has been fairly well overcome, yet the life is absent. It must be understood that the use of non-halation plates is by no means to be discouraged. They are of great assistance, but by this special development greatly improved results can be obtained. You will not only retain the benefit of the double coated non-halation values of the plate, but will aid the plate employed in preserving and registering more accurately the view as it normally appears.

361. The photographing of interiors of the home admitting windows into the view is really important in making the room appear cheerful. The lace curtains and decorations generally with the strong light entering through the window, naturally over-exposing these portions would, if treated in the ordinary way, produce nothing but a haze and mist. While by the special development you can retain every thread of the design and figure in drapery and curtain as well as a clear view of the sash and window-frame, and at the same time obtain clear detail with splendid atmosphere throughout the room.

362. In the photographing of shops, public halls, and in extreme cases the photographing of difficult objects such as machinery which is stationary and cannot be removed to a



Interior Made with a Non-Halation Plate, Ordinary Development

The Same Interior Made on an Ordinary Plate, with Special Development

Illustration No. 12
Example of Overcoming Halation in Interior Photography
See Paragraph No. 364

more favorable light; and where in many cases the only illumination obtained comes from the side or rear, the windows which admit this one source of light must be taken into the view. By the ordinary method of developing, even with especially prepared plates, the results under these conditions would be very unsatisfactory and the worker would almost consider it impossible to produce a good presentable picture of his object or view. By this special method of development all this is overcome.

363. It is a fact that any effect that is visible to the human eye can be retained in the picture by proper exposure and development.

364. Illustration No. 12 is a representation of such a view as one would be apt to believe impossible to secure without so much halation that the interest of the view would be lost. This picture becomes more interesting as an illustration in this instruction for the reason that it was made by one of our students after making a miserable failure of the same view by ordinary method of developing.

METHOD OF DEVELOPMENT.

365. The entire success of this method of development lies in sufficient exposure, and as the latitude as to extreme exposure is so great we must strive only to give full time, as any reasonable amount of over-exposure can be treated in the development of the plate. In the wet plate days we had less difficulty with these obstacles than we have with the dry plate. Why? For the reason that the emulsion of a wet plate was not $\frac{1}{60}$ as sensitive to white light as an ordinary dry plate to-day; consequently, there was more latitude to the exposure.

366. Next to the wet plate we have the process plate, or the lantern slide plate, all of which are extremely slow plates. For the lantern slide we require the clearest plate possible. The lantern slide must be absolutely clear and free from fog—shadows must be transparent. With the extremely rapid plate this would be impossible to produce except where the

most accurate exposure is given, and even then the results are not as satisfactory nor uniform. While the extremely slow plate is superior for quality, yet for general commercial work the slow plate would be impracticable. In many instances quite rapid exposures are necessary to obtain certain results which could not be obtained with the slow plate, and therefore the most rapid plate must be employed and a means of producing the same results, as is possible with the slow plate, must be accomplished in the development.

367. As stated in the forepart of this instruction, the entire success of special development rests in the exposure. You must time for the most dense shadows, and time them fully; a little over-time will do them no harm, as the over-time can be cared for in the development. By timing for the most dense shadows with this development the highlights will care for themselves, for you treat them in the developer so as to preserve them.

368. A good guide for exposure would be as follows:— Where you would ordinarily give ten seconds, with this method give from thirty to forty seconds' exposure, etc. All the detail in the most dense shadows must be supplied by the exposure, the rest you obtain in the developing.

369. The slow process of developing, applied by this method, will, with a full-timed exposure on a fast plate give you the same excellent results as a long exposure would give you on a slow plate in which the action of light upon the plate is so slow that it does not fog the plate. With a slow plate developed in a normal developer all chemicals act equally, for there are no great differences to overcome, while in the fast plate there are enormous differences in the effect of light between the strongest highlights and the most dense shadows. In severe cases, by this method of timing fully the most dense shadows, the highlights would be extremely over timed; therefore, in order to give us a well-balanced negative, we must restrain the highlights during development, and hold them in check until the shadows are fully developed.

DEVELOPING FORMULA.

370. STOCK SOLUTION No. 1.

Water	24 ounces
Pyrogallic Acid	1 ounce
Sulphuric Acid	8 drops

STOCK SOLUTION No. 2.

Sulphite Soda (hydrometer test 70).

STOCK SOLUTION No. 3.

Carbonate Soda (hydrometer test 40).

371. To develop take one ounce of No. 1, one ounce of No. 2, and ten to twelve drops (no more) of No. 3, and add twelve ounces of water.

372. Before beginning to develop let us consider again the nature and objects of each chemical used in developing. Stock Solution No. 1 is your pyro solution, or (developing agent) strength producing agent. Stock Solution No. 2, sulphite soda, is your color regulating chemical. Stock Solution No. 3, carbonate of soda, is your detail-producing chemical.

373. In ordinary developing if you desire more contrast you would increase your pyro, because pyro being your developing agent gives you strength, builds up your highlights. If your plate developed yellow in color, you would increase your sulphite of soda in order to retain the proper color. If your plate lacked detail, and developed too contrasty, you would add carbonate of soda, because it opens the pores of the film and permits the pyro to get to the shadows, and, therefore, is your detail-producing chemical. For this method of developing we have provided by prolonged exposure all the necessary detail, so all we require is to retain this detail and produce the proper strength. It is absolutely impossible to develop a plate without at least some alkali, or detail-producing chemical. It requires but a very small amount of carbonate of soda,

yet some of this chemical must be used, or the pyro will not attack, and the plate will not develop.

374. Ordinarily, we would desire to have the pores of the film open up as it were, by means of carbonate of soda, thus permitting the pyro to act and build up, and supply the strength necessary. In this case, however, we do not desire the pores to be open, as we are already supplied with the detail by the exposure; therefore, we use only a few drops of the detail-producing chemical, merely sufficient to allow the pyro to develop the plate. The development will be gradual, and the shadows and highlights will build up gradually in their proper proportions, the plate remaining clear and crisp throughout the development.

375. When first placing the plate in this solution, it may require some three or four minutes before the image will appear. If it does not appear by this time, add three to five drops more of the carbonate of soda, or Solution No. 3. These additional drops of alkali will start the plate developing quite freely. After a few more minutes add a few drops more of No. 3, and again from time to time, *if necessary*, until the plate is fully developed.

376. You must bear in mind that you have added so little of this solution that the pores of the film are not filled with the carbonate of soda, none of your lights or shadows are clogged or choked; your plate is clear throughout, and your developing has been deeper and more solid, and, therefore, is really developed farther than if it were developed in the ordinary way.

377. Should you find after developing for some time that the plate is apparently fully developed with good, clear detail in the shadows, yet lacking snap in the highest lights, and continuous developing does not seem to build them up, then pour off this solution and make up a normal developer according to regular formula for universal developer. (See paragraph 328.)

378. Immerse the plate in this normal developer for only a moment, examining very closely, for in the normal developer the plate will build up very rapidly. When you secure the

proper strength which should not require more than a minute or two at the most, rinse the plate in plain water, and finally fix in a plain hypo bath free from other chemicals.

379. As the developing of the plate by this method is quite slow, requiring fifteen to twenty-five minutes, avoid undue exposure to the ruby light, as you are apt to fog the plate by long development in too strong a light. It is advisable to cover the tray during development and only uncover when you wish to examine it. These precautions must be taken in order to insure perfect success. With care and patience the most beautiful results can be obtained.

CHAPTER XIV.

Developing or Gaslight Papers.

Introduction.

380. **Introduction.**—Developing paper, more commonly called gaslight paper, is a paper which can be printed by light of any kind and from negatives of all descriptions. The image is not visible after exposure to the printing light, being seen only after the developer is applied. The most marked difference between this class of printing papers and printing-out papers is in sensitiveness. So sensitive is the gaslight paper that it cannot be handled safely in daylight, nor should it be unduly exposed even in ordinary lamp light. The entire process of manipulating developing papers is quite simple, but like all other photographic processes it requires some skill and judgment, both of which are readily acquired by careful observation of each detail and by close adherence to the rules given herein.

381. The developing paper process is one of the most convenient methods of finishing prints. Pictures may be produced with it regardless of weather conditions. Neither cloudiness, dampness, or any other deterring feature need be considered. The photographic worker is entirely independent in this respect, being able to finish prints either day or night. For the professional photographer this process simplifies work enormously, as the printer is able to take one negative at a time and print the complete order. This makes it possible to give precedence to rush orders and make complete delivery of the order when promised.

Further than this, each and every order can be completed and ready for delivery without delay.

382. It is not necessary for the amateur to go into a closed dark room, as it is possible to print work at night, which may be done on kitchen or dining-room table, in comfort. An ordinary electric, gas, or lamp light, can be used for printing. After printing, the paper may be developed but a few feet from the light, by simply interposing between the light and developing trays a piece of heavy cardboard, or similar material.

383. In no other department has the photographer such a range of choice as with developing papers. They are made in many different grades and surfaces, which make it possible to obtain good prints from practically any kind of a negative, by using proper judgment in the selection of the particular paper best suited to the negative in question.

384. **Brands of Paper.**—So rapidly has the popularity of this process developed, that there are now on the market a great variety of brands of developing papers. Among the most popular are "Velox," "Argo," Artura" and "Cyko," each particular brand having its various grades and surfaces. Every brand of paper has its own peculiar qualities, yet the particular brand for your use is not of serious importance. However, the grade and surface must be taken into consideration when making the first experiment.

385. **Grades of Paper.**—Most of the gaslight papers tend to increase contrast, being especially suitable for thin, flat negatives. Practically all developing papers are divided into two general classes—hard and soft. The *hard* grade is intended for flat negatives, as it works with a great amount of contrast. It should not be used with hard, contrasty negatives.

386. The *soft* grade is best suited to negatives of strong contrast, giving the best results when soft effects are desired.

387. All manufacturers do not use the terms "hard" and "soft," but the *hard* grade is generally termed "Regu-

lar," or "Carbon," while the *soft* is "Special," or "Portrait."

388. **Choice of Paper.**—The majority of persons being initiated into the art of photography as a rule lean toward the selection of glossy surface paper. Only after the artistic taste has been cultivated does the inevitable revolution against the glossy surface set in. We do not question the fact that glossy prints on printing-out paper give most pleasing results, on account of warm tone, but it must be admitted that with developing papers it is different—the black and white image appearing much more rich on a matte surface. Not only is this true, but the glossy gaslight papers are not as easy to manipulate. At times they have an objectionable tendency to yield surface marks, which afterward have to be removed. On the other hand, the very rough papers require special care, and should not be used when making first trials. The best grades and surfaces to employ are those which have a tendency to increase the contrast, and at the same time give a smooth matte surface. Therefore, the first work should be made on a paper like "Velox" Regular Carbon, "Argo" Carbon Matte, "Cyko" Contrast Matte, "Artura" Carbon Black Matte.

389. **Caution.**—It is necessary to caution the beginner at the very outset of his work not to be discouraged by apparent failure in early stages of the work. Study this instruction not only once, but go through it thoroughly two or three times, as the cause for any failure will probably be that some point which is essential to complete success has been overlooked.

CHAPTER XV.

Printing and Developing.

Brief General Instruction.

390. **Printing.**—A good rule to follow is to sort your negatives. When about to print from them, print the heavy ones first, using " Special " developing paper; then for thinner plates use " Carbon " or " Regular."

391. When making exposure be sure to cover the box containing the paper, as it is very sensitive to light, which makes it an easy matter to ruin an entire box of paper, by allowing the box to remain uncovered during a single exposure.

392. **Proper Light for Developing.**—While developing papers are not nearly as sensitive to actinic or white light, as dry plates, it is still necessary that a certain amount of precaution be taken. A strong yellow light, or dim lamp light is perfectly safe, providing it does not strike directly on the paper. There is absolutely no need for developing by a dark room lamp. Always load the printing frame and develop in the same degree of light.

393. **Printing Light.**—While it is perfectly practical to make prints by the use of daylight, it is preferable to use artificial light—a candle, kerosene lamp, or electricity. Artificial light is more steady and even than daylight. Daylight at 12 o'clock noon is, of course, much stronger that at 4 o'clock in the afternoon. Therefore, it makes a vital difference as to the length of exposure, while with artificial light the duration of exposure remains practically the same at all times.

394. **Exposure.**—Length of exposure depends, of course, on the density of the plate and the distance between the negatives and the light. For example: When printing from a medium strength negative, the exposure should be eight seconds under a 16 candle-power incandescent light, at a distance of twelve inches from the light. If the negative is placed at a greater distance from the light, the time of exposure will increase proportionately, according to the following ratio: A soft negative which prints in four seconds, at twelve inches distance, will require sixteen seconds at twenty-four inches distance.

395. Although gaslight paper can be developed with solution made from the contents of prepared tubes, which simply requires the addition of water to the powders (the developing solution put up by manufacturers is good), yet the preparing of your own developers will prove extremely advantageous. You may use the formula which accompanies each package of paper, or the following will be found to give good results:

396. **Metol-Hydroquinone Developer.**

Water	24 ozs.
Metol	15 grs.
Sulphite of Soda (Anhydrous)	3 drs.
Hydroquinone	1 dr.
Bromide of Potassium	4 grs.
Carbonate of Soda (Anhydrous)	5 drs.

If soda crystals are used double the above quantity will be required.

397. Dissolve the chemicals in the order indicated in the formula. For use, dilute with an equal amount of water.

398. Remember *hydroquinone* gives *contrast; metol* gives *detail,* even to flatness, so if, with the correct exposure, your results are flat, the addition of a trifle more hydroquinone will give more contrast.

399. When once the correct exposure necessary for the

negative you are printing from is ascertained, it is a good plan to write on the back of the negative the number of seconds required to print. Thus, if you have occasion to again print from this plate, you will know the exact exposure without experimenting.

400. Where dense negatives are to be printed from, it is best to use your developer almost full strength and employ a "soft" grade of paper. It is well to print from heavy negatives first and when you come to the thin plates dilute the developer one-half with water and use Carbon paper. The more dilution, the more contrast can be produced; but avoid the extreme, as there will be danger of running into olive or green tones.

401. The addition of a few drops of a ten per cent. (10%) solution of bromide of potassium will aid in obtaining contrast. If the prints do not develop clear, bromide should be added until they do. Care must be taken not to add too much bromide, because green or olive will be produced, and to remedy it, more developing solution will have to be added, or a new bath prepared.

402. Add but a drop of bromide at a time, or the green tones produced will necessitate more tampering with the bath.

403. It is well to place prints in an acid clearing bath before fixing. This bath will prevent mealiness and muddiness on the surface of print. Make clearing bath as follows: To two quarts of water add four drops acetic acid. Allow prints to remain in this bath one minute, then place in the fixing bath for at least twenty minutes.

404. For the fixing bath use the following:

ACID HYPO FIXING BATH.

Dissolve:

Water .....64 ozs.

Hypo .....16 ozs.

405. When thoroughly dissolved add the following hardening solution, dissolving the chemicals separately and in the order named:

Water	5 ozs.
Sulphite of Soda (Desiccated)	½ oz.
Acetic Acid No. 8	3 ozs.
Powdered Alum	1 oz.

Note.—Should prints bleach in this hypo bath make up a new solution, using half the amount of acetic acid.

406. **Testing Exposure.**—Use small strips of gaslight paper to test and experiment with. After you secure the proper tone and everything is working well, proceed to make your prints. You can use the developer over and over again, by adding a little more fresh stock to keep up the bulk of bath.

407. **Caution.**—It is essential that the hands be perfectly clean and dry when handling the sensitive printing paper. They must also be thoroughly cleansed before developing, and never attempt to develop paper after having had your hands in the hypo, but wash them thoroughly, removing every trace of hypo from the hands. In order to save placing the hands in the hypo bath after developing each print and the necessity of washing the hands thoroughly before developing a second print, slide the print under the solution and with a wooden paddle keep your prints moving in the hypo for a few seconds. They should never be allowed to remain packed together, but, on the contrary, must be kept separated. After fixing, the prints must be carefully washed and separated by hand. Handling over for half an hour in several changes of water will be sufficient. After prints are washed blot them off with royal blotters; then lay them out on dry blotters, face side up, to dry, unless you desire to mount them at once.

408. **Trimming Prints While Wet.**—Any print you desire to mount at once may be trimmed wet. This can be done very conveniently. Take a square piece of glass, wet it and place your print on the glass, face side down; turn the glass over, and your print is now on the under side, face up. Slide it to the edge and square it to the glass,

then trim the edges with a pair of large shears. After each print is trimmed, place it back in the tray of water until all are trimmed. Then lay the mount on a large glass plate, face side down, one print overlapping the other a trifle, until all are on the plate. Mop off the excess water by placing a blotter over the prints and run over it with a print roller until all surface water is removed. Paste the backs of prints with ordinary starch or prepared paste and mount in the usual way.

CHAPTER XVI.

Printing and Developing.

Detailed Instruction.

409. **Proper Light for Developing.**—While gaslight papers are not nearly as sensitive to actinic or white light as dry plates, still it is necessary that a certain amount of precaution be exercised. A very strong yellow light or a dim lamp light is perfectly safe, providing the direct rays from the light do not strike the sensitive paper. It is not necessary to develop by a dark room (ruby) lamp. The printing frame may be loaded and the development carried on in the same light.

410. **Disposition of Outfit, Management of Light, Etc.**—To insure perfect results the place where you intend working should be far enough from the source of light to prevent the possibility of the paper becoming fogged. Six to eight feet from an ordinary lamp or gas jet is far enough, or if the space is limited work nearer to the source of light, interposing a piece of cardboard between the light and the place where you are developing and loading the plate holder. The safety of your position can easily be determined by taking a small strip of the paper, covering a part of it and exposing the remainder for about 30 seconds in the light in which you intend working. If upon development there is a difference between the exposed and the unexposed portions of the strip, the light is too strong, and you should either move farther away or shade your light more.

411. **Printing Light.**—For exposure, artificial light is preferable to daylight, because it varies less in strength. When you have obtained the proper distance and time of exposure on a test print from a given negative, it is easier to make the remaining prints from the same negative of uniform quality.

412. **Length of Exposure.**—If a kerosene lamp is used for printing we would advise the placing of a piece of camphor about the size of a walnut in the oil. This will have a tendency to make your light of a whiter color and naturally its strength will be greatly increased. With a kerosene lamp you can place your negative, while printing, quite close to the lamp, but keep it revolving and moving so that the light will be distributed evenly over the entire negative. If there are parts of the negative that print slower expose longer on these parts, holding them closer to the light. As a general thing the frame placed about 10 or 12 inches from the light gives the best result.

413. The length of exposure is naturally governed by the strength of negative and the kind of light employed. If a 32 candle-power incandescent light is used with a fairly good negative, from 6 to 8 seconds exposure will be plenty if the negative is held about 10 inches from the light. A thin or soft negative would probably print in 4 seconds. The same negative held 20 inches from the light would probably take 16 seconds. One advantage of holding the negative at least 10 inches from the light is that the light is more evenly distributed. If held very close to the light there is danger of printing one part of the negative more than the other, thereby producing an uneven print. The length of exposure during printing depends entirely on the density of the negative and the strength of the light employed.

414. To find the proper distance from the light at which the negative should be placed during printing, take a piece of white cardboard, actual size of negative to be printed from, and move to and from the light until you find the shortest distance at which the entire card is evenly il-

luminated. You will find that the *regular* papers will need from four to five times more exposure than the *specials*, if the negative is placed at the same distance from the light.

415. The following table will give you a slight idea of exposure, but only practice and close observance of your results can teach you the exact exposure: With special papers, and size of negative 4 x 5, or smaller, held 7 inches from the light of a kerosene lamp, it will require about 30 seconds; Welsbach Burner, 10 seconds; 16 candle-power electric light, 20 seconds; 32 candle-power, 10 seconds; ordinary oil lamps, from 30 to 50 seconds. Regular Carbon papers, 7 inches from the light, with a kerosene lamp, will require about 1½ minutes to print; Welsbach Burner, 40 seconds; 16 candle-power electric light, 50 seconds; 32 candle-power, 40 seconds; average oil lamp, anywhere from 2 to 3 minutes. If a 4-foot gas burner is used, give the same exposure as with a 16 candle-power electric light. If a 6-foot gas burner is used, give the same exposure as used for the 32 candle-power.

416. A good rule to follow is to first sort the negatives. Place your strong negatives in one pile, the thin ones in another, and when about to print from the heavy ones use the special papers of any surface you prefer. In printing from the thinner negatives use the carbon, or regular paper. While making the exposure be sure that the box containing paper or exposed prints is covered. Being quite sensitive to light, it is easy to ruin an entire box of paper by allowing it to remain uncovered during a single exposure.

417. **Printing With Electric Light.**—For studio work and where a large amount of printing is done, a 32 candle-power incandescent electric bulb, which can be arranged along the lines of illustration No. 13, is recommended. This illustration represents one end of a dark room, fitted with a sink, over which is arranged a developing light. About five feet from the sink along one end of the room is the printing light. This light is mounted on a pine board attached to the edge of a shelf, 12 inches wide. On the lower

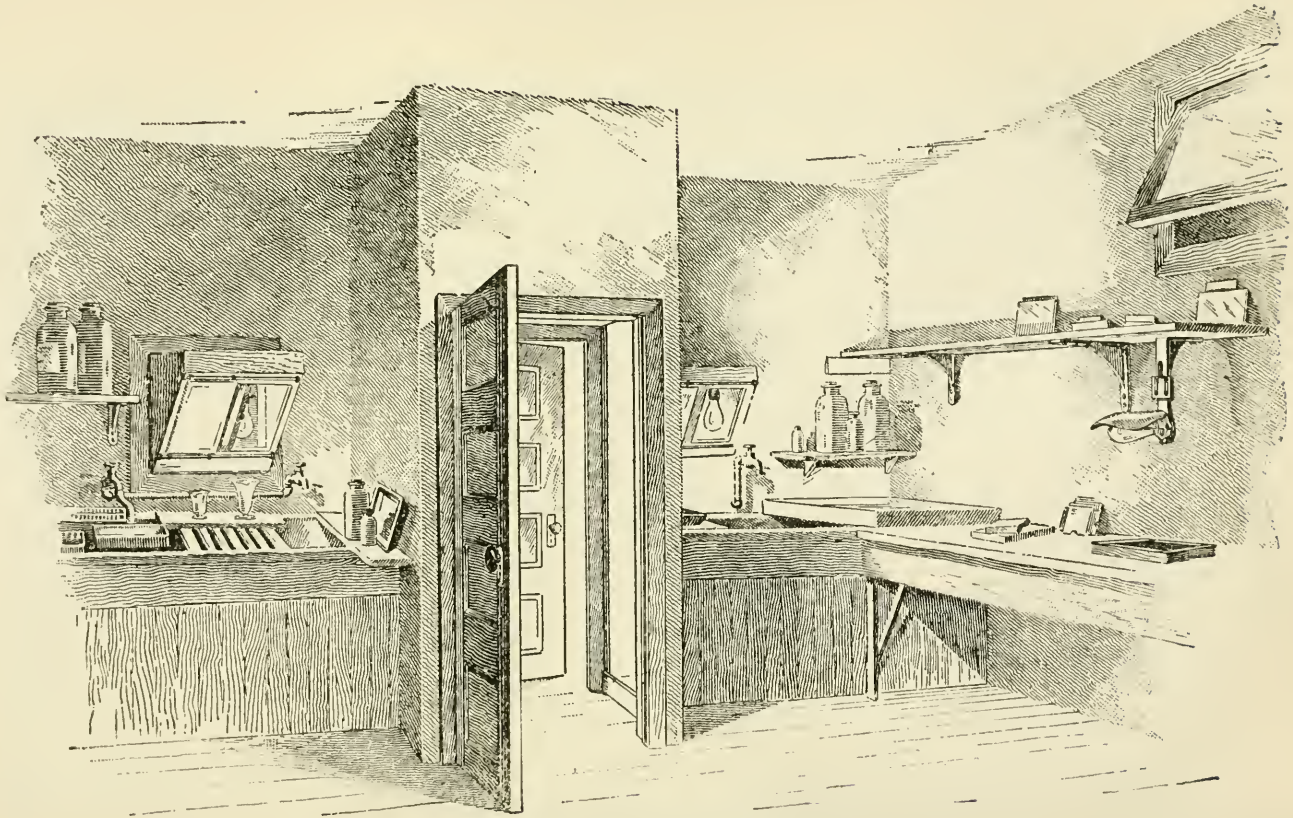


Illustration No. 13—See Paragraph No. 417
Section of Dark Room Equipped for Printing and Developing Gaslight Papers

edge of this board is a socket, into which is screwed a 32 candle-power incandescent bulb. The light is operated by a lever switch attached to the upper end of the board and within easy reach of the printer. This switch can be encased in a box with a slot cut on the top, and a door attached to the front, running the depth of the box. By allowing the handle of the switch to extend through the opening, the light may be turned off or on at will, without opening the door of the box. This box also prevents the possibility of getting an electric shock by taking hold of the switch except by the handle.

418. The light is arranged about 18 inches from the table, with a tin reflecting hood over it. This concentrates all the light, throwing it downward upon the printing frame. An important convenience of this printing light is the advantage one has of being able to dodge in the printing by holding the frame at any desired angle. By placing the box a certain distance from the light the printing may be done by laying the frame flat upon it. By means of the switch the current is turned off after each exposure, which effects a saving on electric light bills.

419. The developing light, which is a 16 candle-power incandescent, is encased in a bevel-shaped box, having a glass front, covered with one sheet of yellow post office paper. The bevel-shaped box permits the light to fall upon the print in the developer. It also supplies sufficient illumination to the room to permit loading the printing frame. By means of the cardboard partition between the printing and developing light, the developing and loading of the frame can be carried on while the paper is printing under the printing light, as one light will not interfere with the other.

420. The essential point is to provide for some simple way for *uniformity of exposure to the light*, as the slightest variation in the position of the printing frame in its relation to the light will make a difference in the time of exposure required for the best results. It is essential to have a perfectly even illumination over the entire surface of the nega-

tive. In order to ascertain whether the light is evenly diffused at the point selected for exposure, take a piece of white cardboard the size of the printing frame. Hold it parallel to the source of light, moving it backward and forward over the box until you determine the location of the part where the illumination seems most even. Allow this to be the printing point. A good general rule is to measure the negative from corner to corner, diagonally, making that the distance for the first test. In most cases it will be a correct guide for printing.

421. **Test for Exposure.**—When opening a package of paper, avoid exposing it to bright light (as previously suggested). If uncertain which side has the sensitized surface, determine which side of the paper shows a tendency to appear concave. This will be the sensitive surface, as the paper curls slightly toward the coated side. When ready to make the first exposure, cut a sheet of paper into small strips, about one inch wide. Place one of the strips over an important part of the negative and make an exposure, using your best judgment as to the distance from the light, and time of exposure. Develop the print and if it is not satisfactory try another strip, varying the time or distance as indicated by the first trial. When the best possible results are secured from the negative in question, proceed to make the desired number of prints from the same negative, giving the same exposure. If time and distance are identical all the prints should be equally good. By comparing other negatives with the one printed from, you will be able to make a fairly accurate estimate of the exposure necessary for each. If care is exercised good results should surely follow in every case.

Nature of Chemicals Used for Developing and Fixing.

422. **Metol.**—A whitish powder, soluble in water. Is a developing agent, producing detail even to flatness.

423. **Sulphite of Soda.**—Transparent crystals, also granular and dried (anhydrous). Soluble in water. Two

parts of crystals are equivalent to one part dried or anhydrous. Chemical action—neutral, or slightly alkali. Controls tone of the print. Do not confuse sulphite with sulphate of soda.

424. **Hydroquinone.**—Nearly white, or pale yellowish needle-like crystals. Must be protected from light and dampness; otherwise it will discolor. Soluble in water. Is a developing agent and produces contrast.

425. **Bromide of Potassium.**—Colorless crystals. Dissolves readily in water and is a restraining agent.

426. **Carbonate of Soda.**—Dried, anhydrous crystals. (See Glossary.) Is extremely soluble in water. Action, alkali. Its action in developing—opens pores of the emulsion in the paper so that the developing agent may act.

427. **Hyposulphite of Soda.**—Put up in crystals and granular form. Colorless. Chemical action, found both neutral and acid.

428. **Alum.**—Colorless crystals; also put up in powder form. Chemical action, acid. Dissolves slowly in water. Possesses qualities that harden the film.

429. **Acetic Acid.**—Colorless liquid. Full strength. Will blister the skin. Chemical action, acid. Hardens film and prevents staining. The strength of this acid increases with the temperature; therefore, care should be taken that the fixing bath is kept cool, or the acid will gain too much strength and a strong sediment will be formed in the bath, causing it to become milky and liberate an excessive amount of sulphur from the hypo, causing sulphurization. Prints fixed in a bath of this condition will turn yellow when exposed to the air and light.

430. **The Use of Bromide of Potassium.**— All developers require the addition of a certain amount of bromide of potassium to keep the whites cleared and it is most conveniently used in the form of a 10% solution, which is made by dissolving one ounce of bromide in ten ounces of water. As the amount of bromide necessary varies with the age, degree of dryness of the paper, the purity of the water and chemicals used, it can only be given approximately. It is

easily determined, however, by first adding the amount given in the above formula to the solution and then making a trial test by laying an inch strip of paper over an important portion of the negative and printing and developing it in the regular way. If the whites appear fogged, add a few more drops of the bromide solution. If on the contrary, the whites are clear and the blacks have a greenish tinge, there is too much bromide in the developer and it will then be necessary to add a little of a stock solution of developer that contains no bromide. To avoid this latter necessity, in adding the amount of bromide do so very slowly and drop by drop, making tests as directed.

431. **Effect of Bromide on Tone of Velox Print.**—Note that when just enough bromide has been added to keep the whites clear, the blacks may have a bluish tinge. Then, if more bromide is added, little by little, and a test print made after each addition, the tone of the blacks will be seen to change gradually from bluish-black to pure black, and if still more bromide is added, to greenish or brownish blacks.

432. **Metol Poisoning.**—Metol is of a poisonous nature attacking some people more than others. It often causes an itching and soreness of the skin. With ortol there is little likelihood of danger and practically the same results can be produced as with metol. If one is subject to metol poisoning, the following ointment will be found to give almost immediate relief:

433. **Ointment Preventing Metol Poisoning.**—

Ichthyol	1 dr.
Lanoline	2 drs.
Vaseline	3 drs.
Boracic Acid	2 drs.

434. Add to this a drop or two of oil of lavender, which destroys all unpleasant odors. Rub well into the skin. It is also excellent for cuts or burns.

435. Another positive cure for metol poisoning, but one which is rather severe, is soaking the hands twice a day for 15 minutes in a strong solution of salt and vinegar.

436. **Developing Notes.**—There are a number of suggestions as to developing, which should be very thoroughly studied and carefully followed to insure good results. Prints may be developed by immersion in the solution or the developer may be applied with a tuft of cotton or a brush. If the former method is to be employed the developer should be placed in a tray somewhat larger than the size of the paper you are using. To the right of this place a tray of water and next to that the tray for the fixing bath.

437. The prints should be immersed, *face up*, in the developer and then evenly covered with the solution *at once*, to insure uniformity of development. This method of development is the most satisfactory for the beginner; but for the advanced worker, the cotton or brush method may be employed instead of the developing tray. Provide yourself with a sheet of glass somewhat larger than the print to be developed. Pour the developing solution into a cup, tumbler or graduate. After the paper has been exposed, place it face up on the glass, then thoroughly saturate the cotton or brush with the developing solution, and pass it quickly over the surface of the print, applying the developer evenly and abundantly. If the exposure is correct the image will appear gradually and complete development will be effected in about 30 seconds, if the "Special" paper has been used. The "Regular" paper will require about one-half as much time. If the print flashes up *very quickly* and at once grows black, it is a sign of *over-exposure in printing*. If *under-exposed*, the print will, on the contrary, develop *very slowly* and it will finally be found weak in the important parts.

438. If the immersing method is employed and air-bells gather on the surface of the paper, be sure to break them with the tips of your fingers, or with a tuft of cotton. If not broken they will leave white, undeveloped spots on

the print. If you find that the highlights (whitest parts of picture) are gray, it will be necessary to add to the bath a few more drops of a 10% solution of bromide of potassium. Be careful, however, not to use more bromide than is absolutely necessary to secure pure whites, as an excess of bromide will not only restrain the developing and produce contrasty prints, but will also produce greenish prints. Watch the process of development carefully and when you find the print is almost dark enough remove it from the developer. It is necessary to act quickly as each fraction of a second causes the print to grow darker. If the exposure has been too short, you can not expect to make the print dark enough by prolonged development.

439. If under-printed, prolonged development will produce a stained print, generally a yellow cast over the entire print. Remember that hydroquinone in the developer produces contrast while the metol produces detail even to flatness; so if in printing you have given the correct exposure and your results are flat add a trifle more hydroquinone to the developer. This can be done by adding a few grains to the solution, being careful that they are thoroughly dissolved before developing more prints. If, on the other hand, the results are too contrasty add a trifle more metol. For the beginner we would advise making no attempt to change the proportions of the developer. Later on, however, when more experience has been acquired it will be well to experiment along these lines. It is advisable when the bulk of the solution is reduced to replenish with fresh developer added to the old, or used bath.

440. **Diluting the Developer.**—The effect of diluting the developer for prints is just the opposite in action to what it is in developing plates. A diluted developer will give stronger and more contrasty prints while a full strength developer will produce softer prints. Therefore, when you have dense plates to print from, use the developer full strength and print on the *special* or *special portrait* paper. It is advisable to make the prints first from the heavy negatives. When you come to print your thin plates

dilute the developer at least one-half and use the *carbon* or *regular* paper. Remember, the more you dilute the more contrast can be produced and the action of the developer will be just so much slower. You must, however, be careful as to going to the extreme, or the tone will have a tendency to run into an olive, or green. Remember also, the addition of a few drops of 10% solution of bromide of potassium will aid you in obtaining contrast. If the prints do not develop clear, bromide must be added until they do. Always remember, however, that care must be exercised not to add too much bromide, or the resulting tone will be green or olive. To rectify an excessive addition of bromide add more of the fresh developer.

441. **Caution.**—It is essential that the hands be perfectly clean and dry when handling paper during printing. They should also be thoroughly cleansed before developing. Never attempt to develop a print after the hands have been in hypo without first washing and drying them thoroughly, removing every trace of hypo.

442. **Acidified Rinse Water.**—Immediately after development the prints may be rinsed in clear water and placed in the fixing bath. It is, however, advisable to slightly acidify the rinse water by adding 40 to 60 drops of acetic acid to 2 quarts of water. This acidified water will prevent mealiness and muddiness upon the surface of the prints and will also prevent yellow stains, as it will immediately stop the action of the developer.

443. **Fixing.**—When the print is fully developed it should be dipped either into plain water, or the above acidified water for a few seconds to remove the surplus developer, then fully immersed in the acid fixing bath. In this fixing bath *the prints must be kept moving* for the first half minute to insure uniform and thorough fixing and to prevent stains from uneven action of the hypo on different parts of the print. In order to obviate the necessity of frequently washing the hands to avoid mixing hypo, adhering to the fingers, with the developer, and also in moving

the prints from one tray to another, a small stick may be employed, or a glass rod, or even a small glass funnel (using the stem as a handle). Allow the prints to remain in the fixing bath 15 minutes. Then let them lie for an hour in a tray into which water is running slowly from a faucet; or in water which is frequently changed during the hour. Of course, a number of prints may be placed in the fixing bath, or in the wash water, at the same time, care being used in the fixing that they do not follow each other into the bath too rapidly. Also that each one is moved about for a few seconds before it is allowed to sink to the bottom and remain undisturbed. *Prints are often spoiled by neglect of this precaution.* If this is attended to, no harm will be done if the prints remain for a longer time in the fixing bath, except in hot weather, when they may turn brown, as the bath becomes warm. *Use plenty of fixing bath.* Do not attempt to fix prints in too small a solution. A pint is a small enough quantity, even if you intend to fix only a dozen prints. As the fixing bath keeps for a long time a larger bath should be made up and used continually without renewing. A one gallon bath will fix one hundred 4x5 prints, or their equivalent. For large batches and professional use, large quantities of the bath should be made up.

444. **Washing.**—Imperfect washing will cause the prints to fade after a time, owing to the chemical action of the fixing solution remaining in the prints when dry.

445. **Marring Prints.**—Care should be exercised in the handling of the prints, especially when the temperature of the water is somewhat warmer, for in this condition the prints are soft and the edges may easily be marred. The temperature of the wash water should be kept below 65 degrees and when in this temperature the prints should not be handled over too much.

446. **Drying.**—After the prints have been thoroughly washed, they should be taken from the water and placed face down on cheesecloth stretchers. This will prevent curling to a certain extent. Be careful that they are not

piled one on the other as this would cause them to stick to each other. If the prints before laying out are thoroughly blotted with Royal blotters they will dry much faster.

447. **Caution.**—Do not dry your prints between blotters as they are likely to stick and cause much annoyance.

448. **Trimming Prints While Wet.**—In case of necessity prints may be trimmed while wet. For instruction for trimming see "Trimming and Mounting," Volume I.

449. **Trimming Prints When Dry.**—Your prints should be dry and perfectly flat for trimming. A trimming board should be used instead of a knife or ruler, as with the board absolutely true edges may be obtained. Prints may be trimmed with a sharp pocket knife, using a glass with perfectly square corners as a guide for squaring the print. They may also be trimmed with large shears with the glass as a guide. The use of the trimming board however gives the most satisfactory results. For detailed instruction see "Trimming and Mounting."

450. **Squeegeeing Enameled Surface Prints.**—Glossy, Special Glossy or Velvet paper prints may be burnished or squeegeed. Take prints from the wash-water, place face down on a ferrotype tin, squeegee into absolute contact and allow to become bone dry, when they will peel off with the desired lustre. If the tin has been in use for some time, portions of prints may stick. To prevent this, prepare the tins as follows:

451. Dissolve ten grains of beeswax in one ounce of benzine, allowing it to stand for a few hours, in which time a precipitate will be formed. The clear solution should be used for polishing the tins by applying to the surface of the ferrotype plate with a soft cloth (canton flannel.) When the surface of the tin has been thoroughly covered with this preparation, the tin should be polished with dry canton flannel to remove as much of the beeswax as possible. As beeswax varies in its composition, the solution may vary somewhat in consistency, so that an addition of benzine may be necessary to permit polishing the tins easily.

452. **Practice Work.**—The making of gaslight prints is most successfully done by artificial light and we advise its use, especially for your first experiments, and as the general run of negatives is more suited to the *special* grades, we advise using these grades for your first work. You may employ any surface to your liking, whether smooth, matte or rough. The principal difficulty with the manipulation of all makes of gaslight papers lies in the proper exposure. The one advantage of artificial light, be it gas, electric or even the light from a kerosene lamp, is that the strength of the illumination is always the same and when you once obtain the proper exposure, all future exposures from the same or similar strength negatives can be made exactly alike. For your first experiments with developing paper we advise using the formula exactly as given herein, for this formula is prepared for normal exposures and really needs no altering. After you have had a little experience, the formula may be altered. Altering is advised in order that you may learn the effects produced by diluting as well as using full strength. You will learn by careful reading of the instructions that to produce soft prints, the developer must be used full strength, while if you require more contrast dilute the developer with water.

453. **Note.**—You will observe that this method of obtaining contrast with gaslight prints is just the opposite to obtaining contrast when developing plates; because when developing plates, by adding more water you produce softness and more detail, while with paper the reverse is the case. The addition of water, or dilution in other words, gives contrast. Remember this. For your first experiments you should make up several prints on Special paper, observing the exposure necessary to the final development and fixing. Note on the back of each print all data connected with the production of the results. Should the first prints be failures, so much the better, as in that event they will prove the most important prints in your collection for future reference.

454. When failures are encountered consult the Difficulty Department, where you will find the cause, remedy and prevention for all troubles related to the difficulty in question. After you become familiar with Special paper, take up the other grades and surfaces and manipulate them, following instructions closely. In all cases make note on the back of all your test prints, whether good or bad, and file them in your proof file. They will serve as good references for future guidance.

Formula for Preparing the Acid Hypo Fixing Bath.—

Water	64 ozs.
Hyposulphite of Soda (Crystal or Granulated)	16 ozs.

When thoroughly dissolved, add the following hardening solution, dissolving the chemicals separately and in the order named:

Water	5 ozs.
Sulphite of Soda (Desiccated)	½ oz.
Acetic Acid No. 8	3 ozs.
Powdered Alum	1 oz.

This solution will keep well; one pint being enough to fix at least two dozen 4 x 5 prints. If sulphite and carbonate of soda in crystal form are substituted for desiccated, double the quantities mentioned should be used.

The most accurate way of preparing a fixing bath is by using a hydrometer, testing the specific gravity; 70 being the correct degree.

CHAPTER XVII.

Difficulties—Manipulating Gaslight Papers.

455. **Prints Are Too Light, Lack Detail.**—This is due to under-exposure. The negative may be too dense for the "Regular" paper; use the "Special" papers.

456. **Grayish Mottled or Granulated Appearance of Edges or Entire Print.**—This is due to under-exposure and forced development; old paper; paper kept in a damp place; moisture; chemical stains; fumes from ammonia, turpentine, illuminating or coal gas. Always keep the paper in a dry, cool place, give full exposure and never force development.

457. **Prints Too Black.**—This is generally caused by printing from negatives that are too weak, or thin; by over-exposure or over-development; insufficient amount of bromide of potassium in the developer. Perhaps you have selected the wrong grade of paper to use. Try the "Regular" paper in place of the "Special," as more contrast will thus be secured. Or, if you have too much contrast try the "Special;" this will give you more softness.

458. **Green Tones.**—Green tones are generally caused by using too much bromide; over-exposing; using a developer too weak or old. Use a more concentrated developer or add less bromide. A strong, fresh developer permits the use of more bromide than a weak one, without producing greenish blacks.

459. **Grayish Whites.**—If there is not enough bromide in the developer, the whites will turn gray. Add a few more drops of a 10% solution of bromide. If the print is under-printed and forced in development, it will cause grayish whites. Using old paper will cause grayish whites, or it is also possible that the paper has been fogged by white light while printing or during developing.

460. **Brownish Blacks.**—If the developer has become old and discolored, or too warm, you are likely to produce brownish blacks. Developer exposed to the air will oxidize and then produce brown-

ish blacks. This is also caused by using developer too weak. This may also be due to over-exposure, an excessive amount of bromide, or an old or incorrectly compounded developer. Never use developer after it has become discolored or muddy to any great extent. Imperfect fixing; fixing bath lacking sufficient acid; and if prints are not kept moving to allow even fixing, are all causes for brown or light stains. If the brown tone appears after immersing in the fixing bath, it may be traced to impure sulphite of sodium, or too warm a fixing bath.

461. **Too Much Contrast.**—If your negative is a strong and contrasty one, use "Special" paper and develop with full strength developer. A diluted developer will give more contrast. Double strength developer will produce softness. When double strength developer is used increase the exposure and use more bromide to keep the print clear in the highlights. This will give more softness.

462. **Prints, Flat, Lacking Contrast.**—Generally due to over-exposure; or, if the negative is a weak one, full of detail but very thin, you must use the regular grade of paper, as the regular grades develop more contrasty. A diluted developer will aid in producing contrast. Adding more bromide will produce increased contrast, but exercise care that you do not add too much. An over-supply of bromide produces green or brown tones.

463. **Weak Prints (Lacking in Detail).**—This is generally caused by developer being too weak, or under-printing—perhaps under-developing. If the negative is weak, use the regular grade of paper with the same surface. It will produce more contrast. Prints from weak negatives are best developed in fresh full strength developer, fully timed, with plenty of bromide in the solution.

464. **Mottled Shadows.**—This is generally caused by over-printing. Under-developing will also produce mottled shadows. Over-exposed prints, if developed far enough to overcome the mottled effect, would be too dark; therefore, make shorter exposure, so as to be able to develop fully, and this trouble will be overcome.

465. **Prints Too Dark.**—This is generally caused by over-exposure in printing and over-developing. Make shorter exposure and develop longer. Or, remove prints from the developer as soon as they are fully developed and get too dark. Properly exposed negatives will not develop too dark in the developer.

466. **Small Yellow or Purple Stains.**—This is generally caused by developer failing to spread evenly over the entire print; developing prints face down; surface of prints touching bottom of tray, or using trays that are not clean, and by prints being allowed to

remain in the water too long before fixing, after developing. Prints that are not kept moving in hypo bath when first placed there will stain; air-bells gathering between surface of the print and hypo, when first placed in this bath, will cause yellow or purple stains; incomplete fixing will also cause these stains.

467. **Yellow Stains All Over the Print.**—This is generally caused by under-printing and trying to force the print in development; prolonged development; developer too weak; not fixing long enough; insufficient washing after fixing will also cause this trouble. Always dip prints into the acid bath before fixing. Forcing development of an under-timed print will cause stains. In some cases it is due to the fact that the water contains too great a portion of iron. It is very easy to determine that the trouble is due to incomplete fixing, because in that event the print will have a sweet taste. Sea air will affect gaslight paper, causing yellow whites; so packages should not be left open, and prints should be developed immediately after exposure.

468. **Blisters.**—Blisters are generally caused (if they do not appear until the prints reach the hypo) by too strong a hypo bath, or too much acid in the hypo; uneven temperature of developer, fixing bath and washing waters; final wash waters may be too warm. Prints may have been creased or broken while washing. Do not allow water directly from the tap to fall upon the prints.

469. **Blisters on Sepia Prints.**—Blisters showing on sepia prints doubtless come from the insufficient use of hardener in the fixing bath, when making the black and white print. Too strong a solution of developer, or too long immersion in this solution will also cause blisters. A salt bath after bleaching may be used if blistering is excessive.

470. **Round White Spots.**—These are generally caused by air-bells gathering on the surface of the paper when the print is first placed in the developer. Always slide the print under the developer, and if air-bells have gathered, break them with the tip of the finger.

471. **Milky Deposit on Surface of Prints.**—This is caused by using a hypo bath which is milky. The bath is either too warm, or too much acid was used; or, the bath was not allowed to settle before using. The deposit will do no harm if you remove it when placing in the wash waters. If there is any trace of milkiness on the dry print it can be removed with a wet sponge. Great care, however, should be taken to have this sediment removed while in the wash water.

472. **Prints Developing Irregular and Freaky, and in Streaks.**—This will occur at times on all makes of paper. It is sometimes

caused by using impure sulphite of soda, which contains sulphate, or by too much dilution of the developer. This difficulty usually occurs during warm weather, when the humidity is great. Keep your developers cool, and if this does not overcome the difficulty wet the prints thoroughly in clear water before developing. Usually a fresh developer used in hot weather will overcome these difficulties.

473. **Edges of Prints Discolored.**—All developing papers are more or less affected when exposed to gas fumes, such as illuminating gas, coal gas, sewer gas and ammonia vapors. It is also caused by using an insufficient amount of developer to spread evenly over entire print. Always keep the package of paper tightly closed when not in use.

474. **Fine Black Lines on Surface of Prints.**—These are generally found on the surface of glossy paper, but at times occur on the matte surface. They are caused by friction before developing and are commonly called "abrasion marks." This friction causes the silver in the emulsion to rise to the surface of the paper, therefore developing black. Oftentimes they can be removed during development by rubbing carefully with the tips of the fingers; or when the print is dry, with a tuft of cotton which has been dipped in alcohol. With matte surface papers these lines can be removed with a soft erasing rubber. Abrasion marks may be avoided entirely by the addition of 5 grains of commercial iodide of potassium to each ounce of developer used.

475. **Small Black Spots.**—Generally caused by pin holes in the negative, or rust in the developer or wash waters.

476. **Round or Irregular Dark Spots.**—These are caused by air-bells forming on the print when placed face down in the fixing bath and by failing to keep prints in motion. It is advisable to turn each print over several times after entering the hypo bath, to insure even immersion.

477. **White Spots Irregular in Shape and Size.**—If a drop of water or saliva touches the surface of the print before printing, it will always leave one or more of these white spots. Extreme care should be taken to avoid the splashing of water from the sink. Never try to blow dust from a negative or sensitized paper, as there is danger of saliva coming in contact with either. Always use a camel's-hair duster for such purposes.

478. **White Spots With Heavy Fine Lines.**—Are usually caused by finger marks. Perspiration from the fingers will leave a mark, on which the grain of the flesh will show. Avoid touching the surface of the paper with the fingers before printing and developing.

479. **Canary Yellow Tones, When the Non-Abrasion Bath Has Been Used, or the Iodide of Potassium Has Been Added to the Regular Developing Bath.**—This is a sure sign that the print has not been fixed sufficiently. The canary color should disappear entirely when properly fixed in a correctly prepared acid hypo bath. The entire disappearance of this color insures correct fixing.

480. **Greenish Yellow Tones Where the Non-Abrasion Developer Has Been Used.**—This is caused from under-exposure and forcing in development. It will fix out if left long enough in a fresh acid hypo bath.

CHAPTER XVIII.

Special Printing and Developing of Gaslight Papers.

481. The reader having followed the preceding instruction on the general manipulation of gaslight paper should have a good knowledge of the general manipulation of gaslight papers. However there are numerous little dodges in printing and developing not covered in the preceding instruction, which will aid the photographer in producing most artistic effects with these papers.

482. There are many advantages to be gained by slight manipulation and dodging in the printing, such as holding back portions which print too black, vignetting undesirable parts of a negative, general blending, etc., also printing-in borders.

483. There are times when it becomes necessary to print from negatives which apparently will not give satisfactory results—negatives which if used for printing-out papers would doubtless be failures. Such negatives, however, may be made to yield splendid prints on any developing-out papers, by proper manipulation.

484. As example No. 1, we will consider a contrasty negative which was probably under-timed or harshly lighted; the highlights print absolutely white, the shadows black, with no detail, and containing no half-tones whatever. Example No. 2, a thin weak negative, muddy, lifeless, flat; highlights thin, filled with detail; a negative of insufficient strength. Prints from such a negative, ordinarily manipulated, would show gray highlights, while shadows would be thin and mealy. No. 3 is a negative

very dense all over, which, with the printing-out paper, could scarcely be made to print satisfactorily. In addition to printing extremely slow with printing-out paper, No. 3 would show absolutely no contrast nor atmosphere.

485. Then there is another class of negatives—those made under most difficult conditions. For instance: Where the circumstances require rapid exposure, necessitating the under-timing of some portions of the plate, such portions will need nursing in the printing, to retain any detail whatever in the shadows.

All developing-out papers, properly manipulated, lend themselves better to these requirements than printing-out papers, enabling all that is in the negative to be retained by proper manipulation in the exposure and development.

486. While dodging in the printing, vignetting, blending and masking, are essential to good results, proper developing under such conditions has much to do with the quality of the finished picture. It is the object of this instruction to describe various methods of dodging, printing, and special developing.

487. **Printing Dodges.**—Let us consider example No. 1: A contrasty negative without half-tones. This negative, as before stated, if printed straight would produce prints with black shadows and white highlights. Now, it behooves us to equalize the tone in order to give uniform prints. This can be done in one of two ways:

488. By tissue papering the printing frame and applying dry yellow ochre to the tissue paper, over the shadow portions of the negative, thus holding them back while the highlights are printing. Or, the glass side of the negative may be ground-glassed and the same application of yellow ochre applied. The former is the more simple, requiring less time. By this method small parts may be held back with the ochre applied to the tissue paper. A negative like this can then be printed evenly by any light; but under circumstances where dodging is employed, you must print further from the light; thus giving more even diffusion and

avoiding lines or marks caused by the ochre applied to the tissue paper.

489. Negative No. 2 is a thin, weak negative, having plenty of detail, yet when printed in the ordinary way the highlights are gray instead of mellow and white. Such a negative requires dodging in the printing, as well as in the developing. In the printing you require some method of retarding the action of the light to print deep and slow, because there are no strong highlights, nor dense shadows, but a flat mealy negative. Therefore, expose the negative by diffused light, covering the printing frame with tissue paper. The catch-lights, or the strongest point of light, should be slightly outlined with a little Prussian blue, applied to the tissue paper. This will give some contrast in the printing. When developing such prints the developer must be diluted, and sufficient bromide used to restrain the print from developing too rapidly.

490. Of course, in the first place, contrasty paper should be selected to print on. Under such circumstances there are three points to be considered: First, the selection of paper suitable to such a plate; second, the necessary dodging in the printing to assist in producing contrast and snap to the highlights; third, the final manipulation to further assist in carrying out the operations necessary to produce the required snap.

491. In No. 3 we have an extremely slow printing negative, hard and contrasty. Such a negative should not be printed from in that condition, but should be reduced with red prussiate of potash reducer, as the negative can then be reduced and made to yield good prints with ordinary manipulation. See instructions on "Reducing," Volume II. If prints are desired from such negatives, without reducing them, the important consideration will lie in the selection of the grade of paper suitable for hard negatives, which should be the "Special" papers. Time them fully and develop slowly.

492. **Dodging During Exposure.**—Frequently during exposure results can be improved if a portion of the nega-

tive is held back somewhat, without masking the entire negative. Portions may be restrained, or held back by the following method:

493. Provide a hand blender, which is made as follows: From a sheet of ordinary window glass cut a strip 12 inches long and ½ inch wide. Paste on the end of this glass rod a round piece of opaque paper, or thin cardboard, about the size of a quarter. The glass rod containing the opaque paper or cardboard, being transparent, will permit the blending of any portion of the negative without interfering with other portions. By means of the blender, interposed between the light and the part of the negative it is desired to hold back, you can restrain to any degree desired. Where for instance, 15 to 20 seconds exposure is given for complete printing, a few seconds restraining with the blender over the parts you wish to hold back will make a surprising difference. The blender must not be held stationary, but be moved about gently with a circular motion. The degree of blending is controlled by the distance the blender is held from the negative. Usually, when the blender is used, printing is done farther from the light, allowing more latitude for the blending and dodging. If the blender is held too close to the negative it will show a sharp line. In printing from portraits where the face or arms are a trifle thin, the blender is almost indispensable. With it the flesh portions may be restrained sufficiently to give a well balanced print. In many instances, particularly in portraiture, to prevent flesh from printing too dark, the entire print is under-printed, thus giving a weak, mealy effect. By means of the blender these portions may be held back and the print carried to the proper depth, affording good results and rich half-tones.

494. **Special Development.**—With the formula recommended for this special developing of gaslight papers, the contrast producing chemical (hydroquinone) can almost be dispensed with, developing being entirely accomplished with metol. As stated in previous instruction, the desired degree of softness, even to flatness or contrast, may be

obtained by altering the proportions of metol and hydroquinone. Metol affords a steady and gradual developer; hydroquinone supplies strength and contrast.

495. **Special Developing Formula.—**

Water.....10 ozs.
Metol.....14 grs.
Sulphite of Soda (Granular or Anhydrous).....½ oz.
(If Crystals are used.....1 oz.)
Hydroquinone.....15 grs.
Carbonate of Potassium.....½ oz.
Mix in the order given.

496. Prepare the hypo acid fixing bath in the ordinary way, keeping the bath at from 50 to 60 degrees Fahr.

497. For your first experiments the developer should be made up in small quantities, and may be altered for strength or softness to suit your needs. Remember, hydroquinone gives strength, metol retards; so if more softness is required use less hydroquinone or increase the metol. If more strength is desired increase the hydroquinone.

498. To derive the most benefit from the experiments work methodically and keep a memorandum of each experiment. The following data should be noted on slips, and these slips filed in a proof file for future reference:

499. **Memorandum Blank**, as follows:

Negative—State whether Strong or Contrasty, etc.
Paper—State whether Special, or Regular, etc.
Developer—
Water..... ... ozs.
Metol..... ... grs.
Sulphite of Soda..... ... ozs.
Hydroquinone..... ... grs.
Carbonate of Potassium..... ... ozs.
Bromide of Potassium..... ... grs.
Results, good; if poor, mark "bad."

500. When printing for development by this formula, if the regular exposure is given—exposure proper for a diluted developer—the print, when placed in this developer,

would have to remain a few minutes before acquiring the required strength. Prolonged development would bring out the blend more evenly, but there would be danger of producing yellow or grayish whites and losing snap and vigor. Therefore, it is necessary when developing by this formula, to print longer than ordinarily. About a third more exposure should be given.

501. In this formula there is used considerable less of the strength producing chemical (hydroquinone). By the extra long exposure given, provision has been made for all the detail required. Therefore it is simply necessary in the development to retain this detail by proper handling of the strength producing chemical. If too much of the strength producing chemical is used the shadows will develop too quickly, showing strong and black; they having been printed deep, the detail would fail to develop in the highlights or whitest parts of the print.

502. Very often you will find that instead of changing the amount of ingredients, metol or hydroquinone, simply adding water will produce the desired results. For thin negatives which have plenty of detail in the highlights and deepest shadows, negatives probably produced by over-exposure and under-development, dilute the developer by adding two-thirds more water. For hard or medium strength negatives use full strength developer and add from 10 to 15 drops of bromide. In using developer of double strength a considerable amount of bromide may be introduced without danger of producing a print too green. When printing from a medium strength negative, it is safe to add bromide until the print develops clear without developing a green tone. Frequently it will be found to take as much as one-half ounce of a 10% solution of bromide to produce good results. Always bear in mind, that green prints are generally produced by adding too much bromide. Add bromide in small quantities until the whites are clear with the green tone invisible.

503. When diluting developer for thin negatives use very little bromide, as the water acts as a restrainer and

ON THE FROZEN RIVER

Study No. 8 See Page 391 By John Chislett

PORTRAIT
See Page 391

Study No. 9

By E. A. Brush

should more bromide be added it would doubly restrain the developer.

504. As you time longer than for ordinary developing when using this bath there is considerable more latitude in the printing. For this reason, do not be afraid to give an abundance of exposure. In testing the developer, first start with 10 to 15 drops of 10% solution of bromide. If the whites are not clear add a few more drops of bromide, and continue adding until the whites are clear. Bear in mind, if the prints begin to develop green, too much bromide has been added. In such an event add more fresh developer to the bath, just enough to keep the prints from developing green, and producing soft whites.

505. A good method of developing a print is to place it in the bath in the ordinary way, handling it over two or three times until the image begins to appear. When it does show place the print on the palm of the left hand, face up, and with the right rub very gently over the surface backward and forward. The rapidity with which the print will develop will be surprising. The warmth from the hand speeds the developing. If there are portions of the print that do not develop as rapidly as desired; or, should you wish to develop some portions before others; rub only these portions, dipping the fingers frequently into the developer. This will give a great degree of latitude in developing and enables the making of good prints even from poor negatives.

506. There are times when it is desirable to exclude parts of a negative from printing. For example: In portraiture, when only a portion of a figure is desired, or part of a waist in a bust picture is to be eliminated; in landscapes, where an artistic picture could be made if a tree or a stump could be eliminated; with a group picture where persons or details not a part of the group, come within the range of the lens. The effect in any of these cases would be very much improved if the objectionable part could be eliminated. This can be done by vignetting.

507. **Vignetting Gaslight Prints.**—By vignetting is

meant the method of printing by which the margins of the picture are made to gradually fade or blend away. This effect is produced in various ways.

508. **Methods of Vignetting Portraits and Eliminating Undesirable Portions of any Negative.**—The methods that will be described are thoroughly practical. While the last method requires a little extra work to prepare, most effective results can be produced through its adoption.

509. The first method is to take a piece of cardboard a trifle larger than the negative you are printing from. Cut a hole in this board a little smaller than the portion of the negative you desire to show in the print. Next make small notches like saw-teeth ¼ to ½ inch deep in the edges of this opening. The saw-tooth effect will blend the light which falls upon the negative because the light will filter in between the teeth. More blend can be produced by holding the cardboard a greater distance from the negative. About ½ inch from the negative is as close as the work should be performed. The cardboard must be kept in motion during exposure (a circular motion is best). See that the card completely covers the parts of the negative that are not to show in the print.

510. A slower method, slow in printing, but which will do away with the necessity for keeping the vignetting card moving, and will produce soft results, is to build up the cardboard one-half inch from the negative and fasten to the printing frame, covering the opening with a fine quality of white French tissue paper, or onion skin, which can be purchased at any photo supply house. If the negative is thin, use light blue tissue. Blue will cause the negative to print slowly, but the resulting print will be stronger.

511. A simple way to arrange this vignetting device so it can be fastened to the printing frame, is to take the cover of a dry plate box, large enough to practically cover the printing frame. Cut into the corners about ¼ of an inch. Make a light cut from corner to corner on both ends and sides, so they can be bent outward, forming a lip, which can be tacked to the printing frame. Next cut a

hole in the cover, as described in making the vignetting card, and cover with tissue paper. Several vignettes can be made different sizes and shapes. One or the other will fit any ordinary negative you may wish to vignette.

512. Another method of vignetting, and this is especially intended for portraits, is to paint the film side of the glass with opaque. Opaque can be made by adding one ounce of a solution of yellow dextrine, or mucilage, to four ounces of a thick solution of India Red. The blocking out must be done in an irregular way—sort of hatch or design shape—to give the appearance of brush developing, as though the print had been developed with a brush, swabbing backward and forward. This method is best applied where white or very light grounds are used.

513. The third method is to produce a vignette effect by simply developing the parts of the print that it is desired to show. This, as before stated, is a much more difficult process, but with practice and care fine results can be produced with it.

514. **Method of Procedure.**—To execute the developing method of vignetting, place the sensitive paper on the negative in the printing frame in the regular way; hold the frame up to a yellow light so you can see through the paper from the back. With a soft pencil outline on the back of the paper the parts of the view you wish to show. By holding the glass and print before the yellow light, you will be able to locate the part you have outlined with the pencil. Next place the paper back on the printing frame and expose the entire negative to the light just as though you wanted all of the print to show. Next wet a piece of glass, a trifle larger than your print, placing the undeveloped print on it face up. The wet glass will prevent the print from curling or sliding. You may hold the glass containing the undeveloped print in the hand, or place it on a table. With a tuft of absorbent cotton, which has been previously dipped in the developer, carefully swab the parts to be developed, always beginning in the center of a

print, working slowly until the image begins to appear. Continue the swabbing as far as desired. As you near the point where it is intended to stop development, work more lightly. In this way a soft blending into the background can be produced.

515. Another method of obtaining vignettes by development is accomplished by the use of glycerine or a solution of sugar, this latter being obtained by boiling crystal sugar until it becomes gummy and then straining it through fine muslin. With this method, truer vignettes can be obtained than when the developer is applied direct to the paper. It is advisable to have a fully developed print at hand, as a guide by which to vignette the print. Take a sheet of glass, coat it with glycerine or the sugar solution and lay the print on it, face up, being careful to observe which way it is taken from the negative so as to be able to locate the highlights with the aid of the guide print. The glycerine will hold the print down without curling. Next, mix one part glycerine or sugar solution with three parts developer and then apply, with camel's hair brushes or a tuft of cotton, the mixture to the print, first laying it on the highlight portions, then on the half-tones, and finally on the shadows, always beginning to work in the center of the print. In this way, over dense shadows can be restrained. Gradually work out toward the edges of the print, leaving these parts until almost all of the print which is desired has gained its full strength. The gylcerine will so retard the action of the developer that it will leave a perfectly vignetted edge, those parts of the print untouched with developer clearing up a pure white in the hypo bath. The sugar solution used as a retarder will tend to preserve the rich black tones of the print, while glycerine will frequently give brownish tones, which are, however, by no means displeasing.

516. Care must be exercised regarding temperature of the developer. Never use a warm or a badly discolored developer. Use fresh cold developer. Warm developer will cause the image to oxidize very quickly leaving a yellow

or brown outline to the vignette. When sufficiently developed, place in your acid clearing bath for a few seconds and then transfer to your regular acid hypo bath.

517. First results will probably not be satisfactory, as it requires a little practice to produce soft blended effects in the vignette. After fixing, should the vignette appear quite harsh; the outline too sharp; printed parts leaving off too abruptly; they can be blended by applying, with a tuft of cotton, a strong solution of chloride of lime. After softening down the vignette, dip the print in fresh water and return to the hypo for ten minutes. This is necessary, because any part of the print which has been removed with the chloride of lime is apt to redevelop and appear again, unless fixed in the hypo.

518. **Life of Hypo Bath.**—The question which arises in the mind of both amateur and professional is, "How long, and for how many prints, can the hypo bath be safely used?" In paragraph No. 443, Printing and Developing, was given definite directions in regard to the number of prints a given quantity of hypo bath would properly fix. The following advice, combined with the photographer's past experience will be a splendid guide to judging when the fixing bath is practically exhausted and, therefore, unsafe for further use. If an acid hypo bath is being used it will, when exhausted, be found to turn milky. There will be a white sediment which does not readily precipitate, but continually floats. The solution will appear soapy, forming suds and bubbles, not unlike soap suds. When the hypo bath acts thus, it should be discarded and a new bath made up at once. Hypo baths should be prepared fresh at least once a week, even if only slightly used.

519. **Scum on Surface of Prints.**—Scum is caused by sulphurization. If the hypo bath is too strongly acid, the acid will release the sulphur from the hypo, causing the extremely milky appearance. This can generally be charged to the acetic acid and alum, the latter being strongly acid. Exact proportions of alum, hypo and acid are essential to avoid this sulphurization, as the relative strengths of these

chemicals vary from time to time. It is almost impossible to judge when the proportions are right, and an excess of either will cause the trouble. With the ordinary means at hand it is impossible to decide which is in excess; so if you are troubled to any extent, it is wise to pour a portion of the fixing bath into a small tray and add a trifle more hypo. Try a print in it and if the results are not better, add twice as much alum as you did hypo, and try again. The effect of sulphurization will then very likely be overcome.

520. Scum is also caused by allowing prints to lie for some time without being separated. These developing papers, having a gelatin surface, are apt when wet to sink to the bottom of the tray and mat (stick together). It is, therefore, necessary to handle them over and over during fixing. If careful to use the acid clearing bath (formula given on page 177) there will be less danger of forming this scum.

521. **Removing Yellow Stains From Prints.**—At times when vignetting or printing—producing a white border on the print—yellow stains are apt to appear. These can be readily removed with the following bleaching solution: In a 10-oz., wide mouthed bottle place 1 ounce of red prussiate of potash (ferricyanide of potassium). To this add 6 ounces of water. Shake well. The red prussiate will dissolve slowly. Wrap this bottle with black opaque paper, label the bottle "Red Prussiate of Potash Solution," and keep in the dark room away from strong light.

522. To remove the stains from the print, take one pint of a clear solution of hyposulphite of soda, 10° hydrometer test, add two—not more than three—drops of "Red Prussiate Solution." Too much prussiate would quicken the action and if it acts too rapidly it is apt to bleach the entire print, possibly staining it; so be sure not to have the bath too strong. With a tuft of cotton swab the parts of the print that have stained yellow. If the print is mounted swab both the print and the mount with the solution until the yellow disappears. Then rinse off with clear water. If the mount was not swabbed, the solution would leave

streaks. It is well to use absorbent cotton or a very soft sponge to remove the water, as the chemicals will thus be more quickly and thoroughly eliminated.

523. After the prints are washed clean, lay them out to dry. The bath must be used only while fresh, not after it becomes discolored. Usually a bath of this kind is good for only half an hour. Should it be found necessary to employ the bath for a longer period, make a fresh solution.

524. **Overcoming Abrasion Marks.**—Frequently there will appear on the prints fine black lines or soiled whites, more especially on glossy prints. These are called abrasion marks and are caused by friction, breaks in the surface of the paper, or rubbing from the paper. As this causes the silver to rise to the surface, when it comes in contact with the developer black lines or soiled whites are produced. To overcome this difficulty add 5 grains of iodide of potassium crystals to every ounce of developer stock solution.

525. Such lines and marks can be removed from the print by rubbing with a small wad of absorbent cotton slightly moistened with wood alcohol. The prints, however, must be perfectly dry before cleaning.

526. For your future guidance results of first experiments should be preserved with a memorandum of your results noted on the backs thereof. These prints should then be filed in the regular proof file.

527. **Practice Work.**—This instruction should not be undertaken until the previous instruction for general manipulation of gaslight paper has been well mastered, because you must have a fair idea of the general results to be obtained before this special instruction is undertaken. As this instruction also deals with vignetting of prints, it will frequently be found most convenient to vignette some of the negatives, omitting objectionable portions, which, if left in the print, would tend to spoil the general effect.

528. After reading carefully, that this instruction may be thoroughly understood, make a few prints and observe their condition from the exposing, developing and fixing to the final drying. Note; we recommend full exposure

with plenty of bromide. After a few experiments with the normal bath, as given in the formula, you should be prepared to adjust the developer for various effects, as explained in the instruction.

529. Preserve test prints of each manipulation, noting on the back of each all necessary data pertaining to their production. Include in this failures and successes alike, as both are important for your future guidance. Whenever meeting with failures, consult the difficulty department, where a remedy for the trouble will be found. File all prints in a proof file for future reference.

Note.—In professional studios, where a large number of prints are fixed, a fresh hypo bath should be made up each day. Hypo is very cheap, and more difficulty from discoloration, blisters, etc., can be traced to exhausted or incorrectly balanced hypo bath than from any other source. If a developer containing iodide of potassium is used the life of the hypo bath can be readily determined, for if the canary yellow of the prints does not disappear in five minutes, it is a question whether the hypo bath is in a condition to fix a print, no matter how long it remains in the bath.

CHAPTER XIX.

Difficulties—Special Printing and Developing.

530. **Shadows Too Black Before Sufficient Detail Has Been Produced in the Highlights.**—This difficulty generally occurs when a negative is contrasty. In a landscape picture there may be extremely heavy foliage in the foreground, with the highlights probably rather dense. In the ordinary way, when printing dark enough to produce detail in the highlights, the shadows are overprinted, and, therefore, develop too black. Generally, they are too black before you have enough detail in the highlights. To overcome this difficulty interpose a piece of cardboard between the light and that part of the negative which prints too quickly, exposing the hard portions for a few seconds only. Keep the cardboard moving, backward and forward, with rotary motion, to produce a light vignette effect. If the cardboard is allowed to remain motionless, the result will be a sharp line between the highlights and shadows. After holding back the shadows for a few seconds in this way, expose the entire plate evenly. By carefully following the instructions in developing, these dense, deep shadows will most always be overcome.

531. **Stains on Edges of Vignette.**—If the vignette is produced in the developing, the stain sometimes obtained on the edge of the vignette is of yellow or brownish color. This is usually caused by developer becoming discolored or too warm, and printing too dark. Follow the instructions in regard to removing this stain.

532. **White, Milky Deposit on Prints.**—This generally occurs if the hypo bath is not properly balanced, having either too much acid or alum, or vice versa. The milky deposit will do no harm if removed from the prints after they get into the wash water. Allow the hypo bath to stand without agitation, and the milky deposit will settle. Then decant the clear solution, and use it for fixing the prints.

533. **Prints Yellow Before Placing in Hypo.**—If the print was under-printed and you attempt to force it by prolonged developing,

it will generally turn yellow. To avoid this difficulty print to the proper depth.

534. **Prints Becoming Yellow in Spots While in the Hypo.**—Yellow spots are caused by air-bells gathering between the print and the hypo solution. Wherever there is an air-bell there is sure to be a yellow spot. To overcome this difficulty, see that prints are thoroughly immersed and air-bells removed when first placed in the hypo. The prints should also be picked over and over, to separate them, while fixing.

535. **Prints Becoming Yellow All Over in Hypo.**—If your hypo is warm, or has become exhausted, too many prints having been fixed for the amount of hypo, the prints will yellow. Remedy: Do not fix too many prints in the hypo bath, and see that the bath is cold—never warmer than 60° Fahr.

536. **Prints Yellowing During Washing.**—This is sometimes caused by vegetable matter in the water. To test the water for vegetable matter, take a pail and fill it with water, placing a handful of alum in it and stirring well. Allow this to stand for a few days and pour off the water. If there is vegetable matter in the water, a slimy, mossylike substance will be found at the bottom of the pail. As a rule, water like this will not cause prints to yellow, as they are not permitted to soak long enough to bring about that result. If prints soak in the water over night and the water becomes warm, it is apt to cause them to become yellow. Wash prints as rapidly as possible, see that the wash waters are not warm, and you will have no trouble with prints yellowing during washing.

537. **Prints Developing Irregular, Freaky and in Streaks.**—This generally occurs when the printing is too dark. By the time the highlights are developed and have sufficient detail, the shadows are only about half developed and appear streaky. To overcome, decrease length of printing. Occasionally, you will find in paper of all makes some that will develop streaky. To overcome this wet the print before developing.

538. **Grayish Whites.**—This is caused by lack of bromide in the developer. Add a drop or two of bromide. If the paper has been light struck the whites will also become gray.

539. **Prints Stained Around the Edges.**—This occurs in old paper, and also where insufficient bromide has been used.

540. **Parts of the Print Will Not Develop, Leaving White Spots—Spots Blending at the Edge Like a Vignette.**—This is either caused by damp fingers or a splash of water. A print of this kind cannot be saved. You must guard against having anything damp come in contact with the paper, before printing, or developing.

541. **Black Spots.**—Black spots are sometimes produced by rust in the water, or in the developer. Any metallic substance that

comes in contact with a print, during developing, will cause a black spot.

542. **Small Yellow or Purple Stains.**—Caused by air-bells on the prints during fixing. Purple stains are generally caused by prints coming in contact with the bottom of the tray during development. Warm fingers are also the cause of purple stains.

543. **White Spots.**—Small white spots, generally perfectly round in shape, are caused by air-bells gathering on the print when first placed in the developer. These should be broken at once. If this is overlooked, the spot will not develop, and even after the air-bell is brushed from the print, if allowed to remain any length of time, the developer will have no effect on the spot which was covered by the air-bell. When placing print in the developer slide it underneath the developer, and with the tip of the finger immediately remove any air-bell, or particle of dirt, which may gather on it.

544. **Tone of Print Brown.**—Brown tones are caused by over-exposure and excessive use of bromide. Learn to print to the proper depth, and be careful not to use too much bromide, but just enough to obtain clear whites.

545. **Tone Blue-Black, Whites Having a Grayish Tint.**—A certain sign that not enough bromide was used.

546. **Too Much Contrast.**—This difficulty you can overcome by being careful to use a soft grade of paper for a contrasty negative; also by using full strength developer, printing portions of negative which are too strong longer than the parts which print dark. To do this, interpose a cardboard for a few seconds between the light and the portion of the negative you want to hold back during printing.

547. **No Contrast.**—For flat negatives use a contrasty grade of paper. Cut down the exposures and develop in weak developer. Oftentimes it is necessary to add a little more bromide, as it will help to produce contrast.

548. **Prints Turn Brown in Hypo Bath.**—If a print turns brown in a hypo bath, there is being produced what is called a sulphur tone. This shows that the fixing bath is not balanced properly, evidently being too strong in both acetic acid and alum. If prints are left in the bath over night they will become quite brown. A bath of this kind should be discarded, or more water and hypo added. The cause of the bath toning brown is that the acid releases the sulphur from the hyposulphite of soda, causing a sulphurization.

549. **Prints Yellow and Bleached After Treating With a Little Red Prussiate Solution.**—This trouble results from using the solution too strong. Employ a weak solution and this difficulty will readily be overcome.

550. **Edges of Vignette Bleaching Too Rapidly When Using**

the Chloride of Lime.—Care must be exercised in using the chloride of lime. If you are applying it with a tuft of cotton, be sure there is not too much chloride of lime solution on the cotton, but just enough to wet it and no more. When reduction has proceeded far enough, place immediately in water.

551. **Chloride of Lime Solution Not Reducing or Clearing the Whites.**—Solution is probably not strong enough. Strengthen by adding more of the chloride of lime. Rubbing just a little bit harder with a tuft of cotton will hasten the reduction.

CHAPTER XX.

Sepia Tones on Gaslight or Bromide Papers.

552. While the practical making of sepia prints by direct development is a problem still unsolved, most satisfactory results are obtained by a process of bleaching and development. The process is extremely simple. Any print which has been properly fixed and washed, regardless of grade of paper (even prints that have been made for some time) may be changed to a sepia tone in a few minutes, without loss of detail in the highest lights, or change of contrast. The tone is governed principally by the printing quality of the negative. A print from a thin, weak negative will give a rather muddy sepia, while one from a negative of good strength will produce brilliant shadows and clear, mellow highlights.

553. **Permanency.**—Prints toned in hypo alum have been proven permanent by thousands of users of bromide paper. Re-developing produces a result chemically identical to that obtained by the hypo alum toning, the print suffering no change in detail or gradation.

554. **Uniformity.**—Following the directions given herein will insure absolute uniformity.

555. **Rapidity.**—A print may be toned a sepia in less than two minutes' time, by the following re-developing process. The prints are first bleached until the deepest shadows have almost disappeared. They are then placed in the re-developing solution until all the detail has re-

turned in the prints. Make up the stock solutions as follows:

556. **No. 1. Bleaching Stock Solution.—**

Ferricyanide Potassium	2½ ozs.
Bromide Potassium	2½ ozs
Water	60 ozs.

557. **No. 2. Re-Developing Stock Solution.—**

Sulphide of Soda	2½ ozs.
Water	30 ozs.

558. Prepare the bleaching bath as follows: Of Stock Solution No. 1, take 4 ozs., water, 4 ozs., aqua ammonia 4 drops.

559. Prepare your re-developing bath as follows: Of Stock Solution No. 2, take 1 oz., and water, 8 ozs.

560. Pour the 8 ozs. of bleaching bath into a tray no larger than is absolutely necessary to hold the prints. This tray must be used for no other solution. Pour the 9 ozs. of re-developing bath into another tray, which must never be used for any other purpose than to hold the re-developing bath.

561. **Manipulation.**—First immerse the print in the bleaching bath. Allow it to remain until but faint traces of the half-tones are left, and the black of the shadows has become weak. (The image will then clearly resemble an undeveloped platinum print.) This will require about one minute. Next rinse the print in fresh water and place in re-developing solution.

562. Allow the print to remain in this solution until all of the original detail has returned. This will require about 20 to 30 seconds, after which the prints should be washed thoroughly. A large variety of sepia tones can be reproduced in this way. The warmth of tone is governed principally in the bleaching bath. For example, a print bleached so there is almost nothing left, will be of different tone than a print bleached but slightly. Judging the exact amount of bleaching can only be acquired by practice. Of course the quality of the negative has much to do with

the depth of tone. A soft negative will give a warmer tone than a hard, contrasty one. A hard, contrasty print should be bleached farther than a soft print.

563. **Prepared Re-Developing Solutions.**—For those who do not care to prepare their own chemicals the prepared re-developing solutions can be obtained from the manufacturers, or any dealer in photographic supplies. One fifty cent package of re-developer will enable one to re-develop three hundred 4 x 5 prints, or their equivalent. The prepared solution is generally put up in a concentrated form, consisting of a box of fourteen capsules and a bottle of solution. Each capsule contains chemicals, which require only the addition of a certain quantity of water and a few drops of aqua ammonia to make a bleaching bath for the reduction of the print before re-development. The liquid contained in the bottle is highly concentrated and should be used carefully. It is important that the prints should have been thoroughly washed so that no trace of hypo remains before re-developing them.

564. **Preparing the Bleaching Solution.**—To prepare the bleaching solution dissolve one capsule in 4 ounces of water. Place this solution in a bottle and label "Bleaching Solution." Next add to this solution 3 drops aqua ammonia (full strength ammonia) and tightly cork the bottle.

565. **Preparing the Re-Developing Solution.**—To prepare re-developing solution take one pint of water and add one-half ounce concentrated solution of re-developer. This solution must also be placed in a bottle and kept tightly corked. Label the bottle "Re-developer."

566. When ready to use, pour the bleaching solution and the re-developing solution into their respective trays and proceed exactly the same as formerly instructed. The prepared re-developer will also produce excellent sepia tones on any bromide or gaslight paper. The age of the print does not seem to make any difference in the tones obtainable. The finest results are obtained from prints which have a good black tone rather than green or olive, as would be produced by the use of too much bromide.

567. **Life of the Re-Developing Bath.**—Both the bleaching and re-developing baths will retain their strength for some time if kept in well stoppered bottles; therefore, immediately after use the baths should be returned to the bottles and tightly corked. If the prints show a tendency to blister it doubtless comes from not having used sufficient hardener in the fixing bath, when making the black and white prints. Too strong a solution of re-developer, or an immersion of excessive length in this solution will also cause blisters. A salt bath after bleaching may be used if blistering is excessive, but should not be necessary if prints when first made are properly fixed in a fresh acid hypo bath. The use of pure aqua ammonia is recommended. The ordinary household ammonia should be avoided. This chemical clears the whites and does not change the tone unless an excessive amount is used.

568. **A Special Re-Developing Bath That Will Not Blister.**—For those who have experienced difficulty with the previously mentioned baths or prepared solutions, we can recommend the following formula. This formula should be prepared in three solutions and the solutions kept in tightly corked bottles.

569. **Solution No. 1.—**

Water	24 ozs.
Ferricyanide of Potassium	1 oz.

570. **Solution No. 2.—**

Water	24 ozs.
Bromide of Potassium	1 oz.

571. **Solution No. 3.—**

Water	48 ozs.
Sulphide of Soda	½ oz.

Note.—Do not confuse Sulphide with Sulphite.

572. For use mix equal proportions of 1 and 2. For example, if you find it necessary to use 4 ounces of solution use 2 ounces of No. 1 and 2 ounces of No. 2. Add to

this from 4 to 6 drops of aqua ammonia (full strength ammonia). Add enough ammonia so that the solution will possess a strong ammonia odor. The Nos. 1 and 2 combined constitute the bleaching solution. Solution No. 3 is the re-developing solution. Pour 4 ounces of this solution into a tray and you are ready for toning. Place the print first in the bleaching solution until it is sufficiently bleached. Then rinse for a few minutes in water, after which place it in the re-developing solution. The image will come up brown, and all detail which was lost in the bleaching will be re-developed. When fully re-developed, place the print in the wash water. The bleaching and re-developing will have a tendency to cause the print to soften. When this occurs place the print, after re-developing and washing, into a weak solution of alum. This will harden the surface. After hardening, wash thoroughly in the usual way. The tone is governed to a great extent by the quality of the negative. As before explained, it will be found that the amount of ammonia as well as the bleaching will vary the tone considerably.

573. **Note.**—This bath must be made up fresh each time. The stock solutions for bleaching will keep indefinitely if kept in a tightly corked bottle.

574. **Practice Work.**—For practice on sepia toning, it is not necessary for you to make special prints, although it may be done; any prints you may have can be re-developed to give a sepia tone. The warmth of tone, as you will note by reference to instruction, is controlled entirely in the bleaching bath, so a large variety of tones can be obtained and, of course, various negatives will have the effect of producing different tones. A hard negative for instance, will produce a colder tone than a softer one, and vice versa.

575. Complete data should be written on the first experiments and these prints filed in the usual way for future guidance.

CHAPTER XXI.

Post Cards—Gaslight Paper.

576. **Grade of Post Cards.**—The different brands of sensitized post cards on the market are numerous. The most popular seem to be "Velox," "Azo," "Cyko," and "Argo." All are good, working very much alike and it rests entirely with the user as to which brand to employ to obtain the best results. We would advise the use of reliable products. Learn to use them so as to get the best effects and when thoroughly familiar with a certain product stick to it.

577. All manufacturers supply post cards in a variety of grades and surfaces. Each brand has a special name, letter or number. They are all known, however, as "hard" or "soft," in the surface desired. The hard is to be used for thin negatives lacking contrast. The surface is supplied in either smooth, matte or semi-matte. The smoothness, however, varies according to its manufacture. The soft grade should be used on negatives having the desired contrast. These are more sensitive than the hard, and, therefore, print faster. The glossy surface is extremely glossy and is suitable for glazing. As most postal negatives are developed thin for quick printing, the hard grade is almost universally used.

578. **Developing Outfit.—**

1 8 x 10 tray for Developing.
1 8 x 10 tray for Acid Clearing Bath.
1 16 x 20 tray for Hypo.
1 16 x 20 (or larger) Washing Tray.

579. These trays should be used only for the one purpose for which they are intended: Developer for developer only; Hypo for hypo only; Acid Clearing Bath for acid clearing only; Water tray for washing only. A good plan is to either letter or number each tray to avoid danger of mistakes occurring.

580. **Printing Light and Printing.**—While perfectly practical to print post cards by the use of daylight, it is preferable to use artificial light. Artificial light is steady and more even than daylight. Daylight at 12 o'clock noon is of course much stronger than at 4 o'clock in the afternoon, and, therefore, makes a great difference in the length of an exposure. Artificial light remains practically of the same strength at all times. To print post cards the exposure is practically the same as on any gaslight or developing paper. When post cards are made in large quantities, an electric light should be employed.

581. **Vignetting.**—Post cards may be vignetted exactly the same as other gaslight papers.

582. **Printing With White Margin.**—In order to print a white border, whether oval or square, will require cut-outs, or masks made of black or opaque paper. Any desired opening may be made and the mask placed on the film side of the negative between the paper and film.

583. All post cards or prints on heavy paper should be printed with a very small white border. This gives a finished appearance. Borders are best applied to dark backgrounds, and vignettes are most pleasing when made on white grounds.

584. **Developing.**—While any developer intended for gaslight papers may be employed, yet, owing to the fact that the emulsion of each brand of paper is different, they require a developer properly balanced to suit the emulsion, and where one formula is used for all papers, the proportions of the different ingredients will need to be altered to suit the paper employed; for example, some papers require more alkali than others; some work soft and, therefore, require less metol than papers that work hard and contrasty. As the emulsion used in sensitizing post cards is somewhat the same as used for coating the regular stock, a developer suitable for the regular stock of any brand will also answer for developing post cards. Very fine results are obtained by using the prepared metol-hydroquinon or ortol-hydroquinon solutions supplied by the different paper manufacturers. Both of these solutions work well and are always ready for use. With different degrees of dilution splendid results can be obtained on any of the different products.

585. **Fixing.**—The acid fixing bath should be used the same as for all gaslight papers. As hypo is inexpensive this solution should be made up in large bulks, and fresh baths prepared frequently.

586. **Substitution of Ortol for Metol in the Developer.**—The metol-hydroquinon developer usually gives the best results; however, ortol may be substituted for metol. Metol possesses somewhat of a poisonous nature to some, often causing an itching and a soreness of the skin. With ortol there is no danger of poisoning, and the same results can be produced. When ortol is used, use the same quantity as metol.

587. **Washing.**—Wash the cards in the usual manner, handling them over occasionally to insure thorough washing.

588. **Drying.**—The greatest difficulty to overcome in drying photographic post cards is to prevent their curling. One of the best methods is to stretch cheesecloth tightly over a light wooden frame. Place your cards, face down, on

this frame and allow to remain there until dry. Previous to laying them on this cheesecloth, carefully blot them and place the cards between two blotters to remove all surplus water from the prints.

589. Another most practical method is to nail strips of wood about ¼ of an inch thick, on a board, placing the strips about four inches apart. Lay the cards, face up, between these strips with the ends resting against the strips. This will bend the card to almost a half circle. If allowed to remain in this position until dry they will readily flatten when stacked together.

CHAPTER XXII.

Copying With Hand or View Camera.

590. **Introduction.**—Any picture, no matter of what nature, can be copied, only you must understand, first of all, your instrument, and then the photographic quality of the picture you desire to copy. Different kinds of pictures require different treatment. The successful reproduction of a print depends largely upon the operator. In this lesson we will cover only ordinary work that can be performed with the regulation hand or view camera.

Brief General Instruction.

591. **Apparatus.**—The ordinary extension hand or view camera used for outdoor work will answer for all ordinary copying. Fixed-focus cameras cannot be used successfully for this work. Cameras fitted with a long bellows are preferable.

592. **Lenses.**—Single lenses will not do for copying, as they will give distortion and curved lines. A single lens has not a flat field, and as all objects to be copied are usually on a flat surface, you require a lens that will give you a fairly flat field, with a sharply defined image, in which the straight lines of the original are rendered rectilinear and free from distortion. Any ordinary rectilinear lens will do. The shorter the focus, however, the better. With the long focus lens you will require longer bellows, in order to reproduce to the same size. Any lens, which is fitted to a camera with a bellows capacity a little more than twice the focal length of the lens, will answer the purpose.

593. **Copying the Original Size.**—In order to copy a picture to the size of the original, the distance between the lens and plate must be exactly twice the focal length of the lens. Some lenses of long focus are fitted to cameras

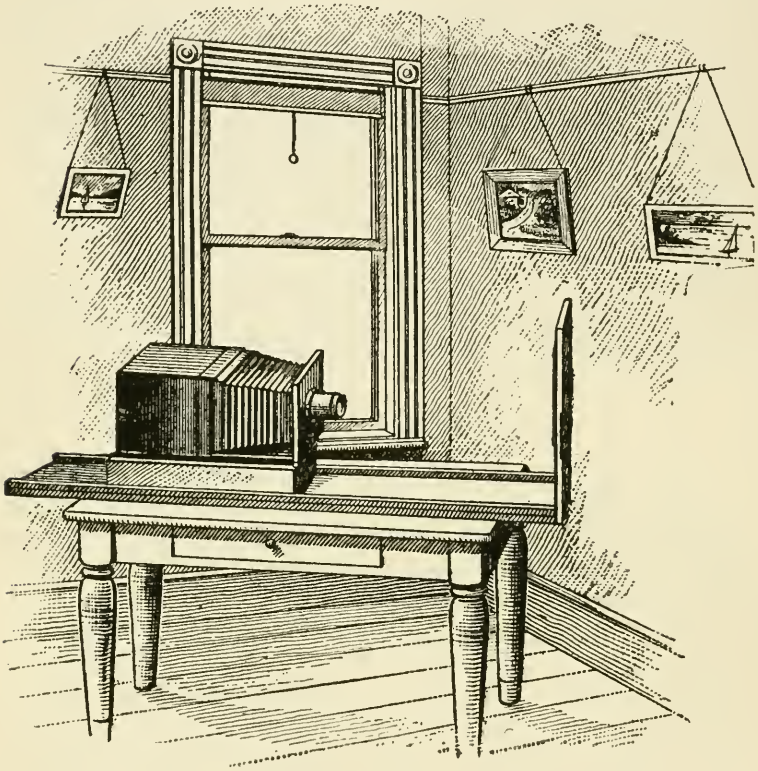


Illustration No. 14
Copying Apparatus
See Paragraph No. 594

the bellows of which are not sufficient to allow of the lenses being used for copying; therefore a lens of shorter focal length would be an advantage. Most modern cameras are supplied with extra long bellows that allow for the extra long focus lens when used in telephoto work, copying, etc.

However, the lack of focal length can be overcome and any short bellows camera can be used by means of a cone attached either to the front or the rear of the camera, or supplementary lenses may be used which fit over the flange of the regular lens, thus converting it into a short focus lens.

594. **Copying Board.**—While a regular copying board and a guide upon which to adjust the camera are unnecessary, yet you must exercise care that the camera is placed square to the original. This is essential, otherwise distortion will result. In Illustration No. 14 we have a very simply constructed copying board, made from an ordinary pineboard, 10 inches wide and 4 feet long, with an upright piece, 10 x 14 inches, attached to one end. Upon this end block you arrange the picture to be copied and for convenient focusing the original may be hung upside down. Your camera and picture are attached to the same board and, therefore, are at all times parallel with each other, and when moving the board containing the picture to be copied to and from the light, in order to secure an even illumination, your camera is moved at the same time, so you are always ready for operation.

595. It would be better to have the camera attached to a box or some support which will elevate it above the board, otherwise you may be troubled with reflections from the board into the lens. A block or box about five inches high would overcome all reflection. To each edge of the board should be attached a narrow strip which will serve as a guide for sliding the camera forward or backward while focusing.

596. **Proper Copying Light.**—Any ordinary window will do, the larger and higher the better. A window facing the north is preferable, as you will then have an even illumination at all hours of the day.

597. **Lighting the Original to be Copied.**—Do not arrange the camera and the picture to be copied parallel with the window, but at an angle so that the picture will receive even illumination. This is essential. See Illustration No. 14.

598. **Copying the Picture.**—As before stated, in order to copy a picture the size of the original, you will need to extend your bellows to twice the focal length of your lens. For instance, if your lens has a 5-inch focus, then extend the bellows to 10 inches. Covering the head and camera with the focusing cloth, slide the camera along from the end of the copying board towards the original until the latter focuses sharp on the ground-glass. When you have the picture focused sharply on the ground-glass you are ready for the exposure.

599. **Plates to Use.**—Ordinary slow plates should be used for all general copying.

600. **Stops to Use.**—When copying good, clear pictures use as large a stop as possible. A good plan is to focus without a stop and gradually stop down the lens until you secure a clear, sharp focus. Then use a one size smaller stop and you will be sure of having a good sharp picture.

601. **Copying Old Pictures.**—For pictures that are yellow from age, perhaps soiled, etc., you should stop down only enough to make them clear and sharp on the ground-glass, for to sharpen them by stopping to extremes would accentuate the spots and stains. Don't misunderstand—your focus must be sharp, but not wiry, for this class of work. For ordinary work stopping to U. S. 8 or 16 will be sufficient. For some copies, however, especially those you make larger than the original, you must stop down more, using from U. S. 32 to 48 stops, in order to make them clear and sharp, and then time in proportion, calculating your exposure by the appearance of the image on the ground-glass.

602. **Exposing.**—Having carefully adjusted your plate-holder to your camera and drawn your slide, cover the camera with your focusing cloth, close your shutter and turn the dial to time exposure. Now, the question of time and size of stop to use are very essential. For instance, if the original is a good clear picture, we would advise using a stop U. S. 8 or 16, and, if a bright day, three seconds exposure is sufficient. The exact exposure, however, can

only be attained by experience. Three seconds may not be enough; it may require double that exposure. All will depend upon the strength of the light you are working under and the stop used.

603. For your first experiments a good plan would be to make several exposures on a plate, as follows. Draw the slide part way, exposing part of the plate, and give three seconds exposure; draw it a little further and give another three seconds exposure; finally, draw the slide entirely and expose again. You will now have three different exposures on this plate, the first portion having received 9 seconds, the second 6 seconds, and the third 3 seconds. Proceed to develop the plate. Some one of these exposures should be correct, and will serve as a guide for future exposures. After a few experiments you will be able to judge quite accurately the correct exposure for all classes of copies.

604. **Developing.**—Normal developer should be used, and all copies having a full exposure must be treated as such in the development. Copies must be developed farther than other exposures, and, to avoid fog and retain snap throughout the development, add three to five drops of a 10% Bromide solution to your normal developer. Mix well and proceed to develop. Copies should be carried one shade farther in the developer than regular exposures.

605. **Printing.**—The quality of the original from which the copy is to be made should determine the printing paper to use. If the original was a good clear print, any printing paper may be used. If the original was flat, then developing paper should be employed, as more contrast can be obtained. Platinum paper usually gives the most satisfaction, as the imperfections, grain of the paper, etc., of the original will show less on this paper.

CHAPTER XXIII.

Copying With Hand or View Camera.

Detailed Instruction.

606. **Apparatus.**—Any camera that is suitable for ordinary photographic work, no matter what size, can be used to copy a photograph or any picture. For the amateur the only essential extra piece of apparatus required is a copying-board, or some kind of an arrangement for carrying the camera and the original to be copied, so that the plate and subject copied may be perfectly parallel.

607. Special cameras are made for copying and enlarging purposes, their bellows being of almost unlimited extension, but unless one desires to make a practice of this business in photography it is not necessary, as previously stated, to go to the expense of procuring any additional apparatus.

608. **Lens.**—As objects which are to be copied are usually perfectly flat and contain lines, the lens employed should be one which will give a perfectly sharp, well-defined image on a flat plate, in which the straight lines of the original are rectilinear. It is, therefore, essential to have a lens which will give a flat field without distortion, and if this can be secured it is not necessary to take into consideration the rapidity of the lens. Everything else being equal, the shorter the focal length of the lens used for copying the better, because the bellows extension required will be much less than when using a long focus lens. To obtain a copy of the same size as the original, the distance between the lens and plate must be exactly

twice the focal length of the lens, and it is very seldom the case that the average camera bellows will rack out far enough to allow the lens fixed to it to be used for this purpose. Hence, the advantage of a lens of shorter focal length. It is not a hard matter, however, to get over this difficulty, as will be seen from the following instruction.

609. As the single or view lens does not give a perfectly flat field, and bows out straight lines toward the edges of the plate, this particular kind of a lens cannot be employed when it is being used to cover a plate which is rather large as compared with the focal length of the lens. When compound or double lenses such as the rectilinear lens, are employed, nothing shorter than one of 6-inch focal length should be used on a 3¼ x 4¼ plate, or a 7-inch lens for a 4 x 5 plate, and the shortest advisable focal length to use with a 5 x 7 plate is 9 inches. If the modern anastigmat lens is employed, or one similarly corrected for the various effects of aberration, etc., it is possible to use an instrument of shorter focal length, as these lenses, due to their peculiar correction, are able to render a perfectly flat field on all portions of the circle of illumination. When using single and rectilinear lenses only the central part of the lens field should be employed, as the defects here are very small.

610. A good general rule, however, in selecting a lens for copying, is to employ one which is of practically the same focal length as the lens which was first used to make the picture being copied. It is possible then not only to make a reproduction exactly the same size as the original, but also to enlarge it to a considerable extent, if desired.

611. Since copying is simply photographing with a print as the subject instead of a person, or object, the operation is not as difficult as it might at first appear to be. The securing of the desired size of the picture is, however, the most puzzling thing, with most beginners at least. Taking it for granted that you have a camera with a focusing-screen so that you can see on the ground-glass the image of the picture which you wish to copy, arrange the camera on the far end of the copying board. Upon looking at the

OUTDOOR PORTRAIT

STUDY No. 10—See Page 391 MATHILDE WEIL

image on the ground-glass after it is sharply focused, you will now observe that it presents a very tiny speck on the ground-glass due to the fact that the camera is at considerable distance from the subject.

612. An important principle of copying is here illustrated in that the nearer the camera is to the object the larger will be the image, and as in most copying it is desired to secure an image nearly, if not quite, as large as the original, the camera must be placed very near to the object. At the same time, the nearer it is to the object the farther must be the ground-glass from the lens, until if we are copying the same size, the lens is exactly twice its focal length from the subject, and the ground-glass is the same distance from the lens. If using a 4 x 5 camera equipped with a lens of 5-inch focus, the total distance from the ground-glass to the print being copied is 20 inches, and the lens will be midway between the two.

613. If it is desired to copy larger than the original, the camera must be still nearer and its bellows extension still greater. Here is where the difficulty usually comes for the amateur, as the average cameras, however suitable for most all other purposes, will not permit of bellows extension sufficient to do copying on any reasonable scale. To ascertain the limits in this direction, extend the camera bellows as far as it will go. Then place a foot-rule on the copying-board and push the camera towards it, keeping the camera square with the rule until the image of the rule is sharply focused. Focusing must be entirely done by moving the camera, keeping the bellows fully extended all the time.

614. If you are using a 4 x 5 camera, and the long way of the 4 x 5 plate—when the rule is focused—just shows a picture of 10 inches of the rule, it is clear that the greatest possibilities of this camera in the way of copying will be to give a picture of an object 10 inches long on a plate 5 inches long, *i. e.*, half the size of the original, and to get that, the bellows must be extended to the utmost. If you possess a shorter focus lens, you will find that with the same exten-

sion of camera it is possible to get a sharp picture with the camera placed nearer to the object, and the image will be larger accordingly; therefore, one of the uses of a short focus lens is to give a large scale picture with a comparatively short extension of camera bellows.

615. But the average amateur does not care to buy a lens specially for occasional copying; moreover, it is not necessary. An ordinary magnifying-glass (the weaker the better) may be placed in front of the lens. A reading glass will do, but is rather more powerful for the purpose than is best. In either case, the glass should be a trifle larger than the lens employed so that the rim of the frame containing the magnifying-glass will slip over the flange of your regular lens. Should the magnifying-glass be too large, it may be centered before your regular lens by means of wooden wedges between the rim of the magnifying-glass and the lens-flange; or another simple way would be to attach around the lens barrel a light spring wire with three little prongs long enough to receive the rim of the magnifying-glass.

616. The effect of this extra glass is to make the lens apparently a shorter focus one, and to allow of the camera being placed nearer to the object being copied, and so secure a larger image on the ground-glass. As the new lens is not so carefully centered in its mounting as a photographic lens should be, and as it is not "achromatized" or "corrected" for photography, it will be found that the image perhaps will not be so sharp as can be obtained with the original lens by itself. But this does not matter very much, because in copying, the object being stationary, it will not move during exposure, so that by employing a small stop it is possible to counteract this want of sharpness and get as good definition when the supplementary magnifying-glass is used as it is possible to secure without it.

617. However, when one has not a reading-glass at hand, we would advise the purchase of one of the Ideal Enlarging Lenses manufactured by the Burke & James Company of Chicago. These are supplementary lenses

that fit over the regular lens like a cap and are made in different sizes to fit any size lens you may have. Therefore, for the benefit of those who have a camera with a short bellows, we would advise that they provide themselves with a copying attachment. They are made in sizes from $1\frac{5}{16}$ to 3 inches in diameter and listed at from $1.50 to fit any size lens up to and including 1½ inch diameter, to $3.50 for the largest size. The $1.50 size is suitable for any ordinary rectilinear lens 4 x 5 or 5 x 7. These auxiliary copying lenses, as you will note, are inexpensive and are made so that they will slip over the hood of the lens.

618. The Ideal Enlarging and Copying Lens is made to be used in combination with any photographic lens, increasing its power for copying to at least twice its original capacity. It will enable those possessing cameras, that are not long focus instruments, to photograph small articles to their full size or even larger, if desired. It will be found invaluable for copying pictures, making lantern slides by reduction with a short bellows hand camera and photographing small objects.

619. Some idea of the value of this lens can be learned when two photographs taken with and without the lens are compared as to size. A 4 x 5 photograph when copied with an ordinary camera will produce a picture about the size of a postage stamp, whereas when the Ideal Enlarging and Copying Lens is attached to the lens the photograph can be copied full size, or can be enlarged beyond its natural size.

620. This lens is composed of two elementary lenses of different density and refracting power, which are cemented together and form one corrected lens. The glass is of the finest optical quality of unusual hardness and brilliancy, and the curves are especially computed to give the best results. Each lens is accurately centered, and has ground and polished edges, which are points of great importance.

621. The lens is mounted in a brass cell, polished and

nickel-plated, with adjustable springs, so that it fits over the hood of the regular lens like a cap.

622. **Extension Device.**—In order to supply sufficient distance between the ground-glass and the lens, the lack of bellows capacity can be overcome by having a box made of very light material, open at each end. This box can be made either to fit into the place of the front-board containing the lens, or it may be fitted to the rear of the camera in the place of the ground-glass. The latter is preferable where the hand camera is employed, for the reason that the majority of hand cameras are supplied with a very small front-board, permitting of a very short cone only, while, when the cone is fitted to the rear of the camera there will be no obstruction between the lens and the ground-glass, and there is more latitude for adjustment of the size of the copy.

623. When the cone is fitted to the front of the camera it must be arranged so that one end will slip into the space occupied by the front-board and lens, and the other end must be arranged to receive the front-board containing the lens; but, as said before, the attaching of a cone to the rear of the camera is preferable, as a larger cone can be used.

624. When a view camera is employed, the cone should be attached to the front of the camera, as the space for the front-board is much larger, permitting of the use of a larger cone, and the attachment is the same as with the professional portrait camera. The cone should be made of light wood, fitted closely to the camera, and, in the case of a hand camera, attached to the rear of the camera in the place where the ground-glass frame is fixed. The ground-glass frame or reversible back (provided the camera is fitted with one) must be moved to the other end of the cone, an arrangement being made to attach this part to the cone exactly the same as it was attached to the camera.

625. The size of the cone depends on the length of focus necessary. It is best to have it a trifle larger than the length of focus required, thus allowing for making

copies larger than the original. For a 5-inch focus lens the total distance should be about 12 inches, measured from the rear of the lens to the ground-glass. Circumstances and the construction of the particular camera which you are using must decide which is the simpler course. In any case, the most important consideration is to allow a largely increased distance between the lens and the focusing-screen. In some manner strive to arrange your camera so that the lens may be placed twice as far from the ground-glass as it is when ordinary landscape work is being done. If you can do this you will be able to copy the same size as the original. When this has been accomplished, copying becomes a very simple process. It is a matter of arranging the original in a good light (not direct sunlight), the camera in perfect line with the original and giving the correct exposure.

626. **Proper Copying Light.**—If the atmosphere is perfectly quiet and there is no chance of the camera or the print being blown about, copying may be done out-of-doors. If the work is to be accomplished indoors, the original should face, or almost face, the window—not be along side of it—and the camera, of course, will be between the subject and the window, but at an angle. By this arrangement the visible grain on the paper, which is seen at its worst when the print to be copied is lit from one side, is done away with.

627. This texture or grain is caused by little particles of the paper standing out above the surface of the print. When the light comes from one side these little particles, standing out, will cast a shadow which will intensify the grain or texture and cause it to appear much stronger. Therefore, in order to avoid the grain in your negative, you must exercise care when lighting the original picture, lighting as broad and flat as possible. If the picture to be copied is very rough, or has a pebbled appearance, use a white reflecting-screen on the side opposite from which the strongest light comes. In this way the shadows of the surface are filled with strong light and they will not show

so badly, if at all. Bear in mind too, that under-exposure also helps to show grain, for if the shadows do not receive enough exposure and the high-light and grain develop up strongly the shadows will be accentuated. The use of an extremely small stop is also apt to cause the grain to show strongly.

628. **Artificial Light.**—While the best results are obtained by daylight yet it is possible to copy at night by lamp, electric, or gaslight. The arrangements, however, are practically the same, except that with artificial light two lamps should be employed, one at each side. This will give a more even illumination. Each light should be partly surrounded by a sheet of white cardboard bent in semi-circular shape, and held in that position with a piece of thread around the top and bottom. This reflects light onto the object and prevents any light shining into the lens. If kerosene lamps are employed they may be placed on the table, nearly between the camera and the picture to be copied—the nearer the object the better, so long as they do not come within the range of the lens.

629. **Exposure.**—With artificial light the exposure may be anything from two minutes to an hour, depending entirely upon the light employed, while in daylight, out-of-doors, even with a small "stop" it may not be more than a few seconds, and indoors from eight to sixty seconds and perhaps more, depending upon the illumination as seen on the ground-glass.

630. The two greatest difficulties in this work occur in correctly judging the exposure and properly developing the negative. You must remember that however clear and bright may be the subject that you are copying, its contrasts are very much less than those of nature; therefore, if you do not desire a flat result, it is very essential to give a full exposure and follow this up with a full development.

631. **Plate to Use.**—The plate to use is not so important—any good plate will do for copying (a slow emulsion preferred)—and unless you have a great deal of this work to do it is better to use ordinary plates and to learn to use

them well than to undertake to try specially prepared plates, for the average worker will produce better results with the regular plate and the majority of professional photographers use nothing else. One point is important: You must never under-expose; aim to over rather than under-expose and develop to a full strength.

632. **Plates.**—While ordinary and slow plates are best for general copying, very good originals are improved sometimes by using an Isochromatic plate. Pictures that are old and stained should never be copied with any color-sensitive plate (Isochromatic or Orthochromatic), as these plates tend to show the blemishes much more strongly, being sensitive to the different colors which are found in old pictures. By the use of slow Orthochromatic plates you can make better copies from a fine print, one full of half-tones and color-value, but never use them on old or faded yellow and marred prints, for these plates are sensitive to the different color values and the defects will appear more prominent in the copy than they were in the original. It is advisable to use a slow plate for the reason that slow plates have more latitude both in the exposure and development. A slow plate when over-exposed can be handled much more easily in correcting the exposure during development. There is also less danger of over-exposing a slow plate. Generally speaking, the slower the plate the finer the grain of the emulsion.

633. **Developing.**—All copies having a full exposure must be treated as such, developed slowly and considerably further than ordinary work would require. In order to avoid fog, and retain the snap throughout the development we advise using three or four drops of a 10% solution of Bromide to your normal developer. Mix well and proceed to develop in the usual manner. Remember that plates from copies should be carried at least one good shade farther in developing than regular work. Work very carefully and once you have made a good copy you will have a good key to guide you in your future work. Great care must be exercised when developing color-sensitive plates.

Either cover your developing tray or develop away from the ruby-light. When examining the plate during development, do so as quickly as possible, as the plate is sensitive even to ruby-light, and will fog in a few seconds.

634. Remember, color-sensitive plates are extremely sensitive to all colors; keep them in the dark. These plates give the best results when developed in the formula accompanying them and should be handled in that way. The plates after developing should be fixed, washed and dried in the usual manner.

CHAPTER XXIV.

Difficulties—Copying.

635. **Placing the Original to be Copied in the Proper Light.**—In arranging the original picture or drawing in position for copying, great care must be exercised that the light does not come all from one side. To get an even illumination the original should *face* the light as much as possible. Unless this is done, the grain in the paper, no matter how slight it may be, will show very strong in your copy. Whether you are using artificial or day light, be careful that the light strikes the picture flat and illuminates it evenly. With a little experimenting, and carefully watching the effect of the light on the picture and your results, you will readily overcome this difficulty.

636. **Making Copy Same Size as Original.**—If you are using a rectilinear lens and have a long bellows camera, you should have no trouble. Carefully measure the picture and then also measure the image on the ground-glass. If you have no long bellows camera supply yourself with either a reading-glass, or a copying-lens of the kind to be attached to your regular lens. A very good plan is to paste a strip of black paper, exactly 6 inches in length and about ¾ inch wide, on the copying easel or support to which you have tacked your original picture. This should be placed on the side of the original and fairly near to the margin. If you desire to reduce your copy say to half its original size, all that is necessary for you to do is to adjust the focusing until the strip measures 3 inches on the ground-glass; or, if you desire to make it three-quarter size, adjust your camera until the strip measures 4½ inches on the ground-glass. This same method can be applied if you desire to make an enlarged copy.

637. **Copying Water-Color Drawings.**—When copying water-color drawings you will find that, when compared with very dark oil paintings, a dark water-color would require only one-third the exposure, all depending upon the density of the colors.

638. **Making Copies from Oil Paintings.**—When copying an oil painting never turn the picture upside down in order to focus

it. A painting should be lighted from the same direction as the light used by the artist when painting it. One reason for this is that the painter had a motive in laying every brush-mark upon the canvas. Oftentimes you will find the paint is laid on heavily in order to give certain effects to the shadows which the brush-marks cast, so that if the picture is lighted from a different direction the purpose of the artist is confused. Another reason is that when lighted from the correct direction very little glare, if any, from the surface will be noticed. Sometimes it is necessary to place the picture at an angle to the window, with the result that the exposure must be prolonged. This arrangement of the picture will cause uneven illumination, which may be equalized by placing the picture well to one side of the window so that the near side of the canvas is slightly screened by the window casing. It is *not* a reliable test for reflection to place the head in front of the camera, because the light reaches the eye at a different angle to that at which it reaches the lens. The best plan is to focus the picture, remove the lens and ground-glass and examine from the position to be occupied by the plate-holder.

639. The choice of a suitable plate is a matter requiring careful judgment. There are many excellent brands of Orthochromatic and Isochromatic plates on the market which answer well when fairly fresh but are liable to change their color sensitiveness when kept too long. You must also consider the penetrating colors and use the plate and color-screen which is most suitable.

640. **Securing Sharp Focus.**—Always focus with your lens wide open. Be careful that your picture is placed both perpendicularly and horizontally to your camera. Focus as close as you can and then, if you find it necessary use a stop small enough to give you a perfectly sharp image.

641. **Overcoming Reflection.**—Reflections are oftentimes caused by too strong light striking on some light article or wall-paper in the room, either of which may happen to be at such an angle that the light is thrown on to the pictures which you are copying. A little careful observation on your part—covering up such articles with a dark cloth, or placing a screen between the light object and the picture—will readily enable you to overcome this reflection. If you are troubled with reflections when copying a picture which is framed, the glass should be removed if possible, or, by placing a black screen in front of the camera, with a small hole in it just large enough for the lens, you can readily overcome reflection on the glass. The use of a short focus lens is often responsible for this difficulty, as, the angle of view being a wide one, objects in front and a considerable distance from it on both sides are reflected onto the lens. Here again you will find the hood a very convenient

accessory. Using a long focus lens the camera can be placed at a greater distance, thereby lessening the danger of reflection.

642. **Overcoming Distortion.**—Distortion is generally caused by the picture not having been placed perfectly parallel to the ground-glass. If it is turned a trifle to one side or tipped backward, or forward to the camera you are bound to produce distortion. Adjust your camera and picture carefully, having them both perfectly aligned, and you will readily overcome this difficulty.

643. **Overcoming Grain of Paper in Original Picture.**—In some cases it is impossible to overcome the grain entirely, but careful lighting, use of proper plates, full exposure and full development will make it possible to at least not show the grain any more than it appears in the original picture. The lighting, exposure and development are important factors to be dealt with under such circumstances. (Read instruction carefully.)

644. **Securing Proper Exposure.**—Only practice and close observation will enable you to judge proper exposure. Keep a memorandum of your exposures, noting carefully the conditions of light, length of exposure, and whether the plate appears to be under or over-exposed when developing. Examine your results carefully and then govern yourself accordingly the next time you are copying a picture under the same or similar conditions.

645. **Plate Develops Flat.**—This is almost a certain sign that the plate was very much over-exposed. If the plate flashes up quickly in the developer you must immediately take means to overcome the effects of this extra over-exposure by restraining your developer. See instructions for developing over-exposures, Chapter VII.

646. **Plate Develops Thin.**—A plate that develops thin and cannot be carried further in the developer is an extremely under-exposed plate, while if thin and the shadows are filled with detail it is extremely over-exposed but under-developed. In either case treat your plate according to the exposure, when developing, and always carry copy-negatives a little farther in the developing than you would other exposures.

647. **Determining What Plate to Use.**—If you follow the instructions carefully and observe the results you obtain, after a few experiments you will be able to readily determine what plate you should use. For colored pictures you are told to use Isochromatic or Orthochromatic plates. As a rule, for black and white subjects and engravings it is advisable to use ordinary slow plates.

648. **Determining What Size Stops to Use.**—Never use a stop smaller than is absolutely necessary to produce a sharp image. For copying drawings, engravings, etc., in which extremely fine lines are to be reproduced, it is advisable to use a small stop

as this will prevent the clogging of these very fine lines. You will find that when you desire to produce contrast it is always advisable to use a small stop.

649. **Knowing What Lens to Use.**—If you are fortunate enough to own a number of different lenses, the selection of the right one might be a difficulty. A single lens is not to be recommended unless you are making a copy much smaller than the size of the plate it is made to cover and, even then, you will find it will be necessary to use a small stop. An ordinary Rapid Rectilinear Lens will be found to fill the requirements, but it must be used in a good light to make up for the loss of illumination when it is stopped down sufficiently to cover the extreme corners of the plate. When, however, a color filter has to be used in a dark or poorly lighted room this type of lens is almost worthless. The very best lens for copying is one of the anastigmat type because of its exceedingly flat field and its freedom from distortion when used at full aperture on the size of plate it is listed to cover.

650. **Obtaining an Image the Size of the Original.**—When a small and short focus camera is used there is no attachment that will give you such good service as the Ideal Copying Lens, which slips over the regular lens and shortens the focus at least one half. By means of this lens any hand or view camera can be used for copying and an image the same size or larger than the original can be made, providing the original is not larger than the size plate your camera will hold.

CHAPTER XXV.

Bromide Enlarging by Daylight or Artificial Light.

651. **Introduction.**—While Bromide enlarging is perhaps one of the most interesting and profitable branches of the photographic business, yet many have an idea that the making of Bromide enlargements requires an expensive apparatus, and a great deal of time and technical skill. Such is not the case, for you can practically provide the necessary apparatus yourself.

652. The advantages of Bromide enlargements are many. For the *professional,* it enables him to make many of his negatives on small plates, with quicker exposures, and with a large percentage of successful ones, at one-quarter the cost of larger size plates, and at the same time avoid the inconvenience of handling a large and unwieldy camera when quickness is important.

653. Again, many times when these enlargements are made from your small negatives of good customers you would have no difficulty in disposing of them at a good price. This is especially the case with negatives of children. In fact, many photographers make it a point to finish an enlargement from one of the negatives out of every order, especially where the customer is to call for the completed work. When delivering the order, the customer is shown a Bromide enlargement from the same negative and at once becomes interested, resulting in not alone a sale of the enlargement at a good price, but very often, a suitable frame for it as well, all of which add to the photographer's receipts, with but little effort and a slight extra expense.

654. For the amateur, Bromide enlarging is a great

convenience, for by its means beautiful enlarged pictures can be made from any small negative, and made by the amateur himself, without any additional apparatus other than such as he can prepare alone. In other words, his hand camera can be made to serve as an enlarging camera, providing it is of the adjustable focus type and the back is removable or has a ground-glass for focusing.

655. Box cameras or cameras of fixed focus can also be used, provided the back can be removed. In this case, a dark cloth should be attached to, or placed around, the back of the camera, giving it extra focal capacity.

656. The principal advantage of enlargements for the amateur lies in the fact that he requires but one camera for all purposes. In place of being loaded down with a large camera, a medium size instrument will serve him for any and all purposes, and whenever he desires a larger picture than the size of the original negative, he simply makes an enlargement from the negative.

657. Then again, an enlargement is often much softer and better than a direct print, for one has the advantage of manipulating in the exposure by holding back such portions as are desired lighter, and exposing longer other portions which are preferred printed darker. There is the further advantage of printing clouds into the scenery, or taking negatives which are perfectly sharp and making diffused, softer pictures from them.

658. **Bromide Enlarging Briefly Described.**—Bromide enlargements from small negatives are obtained by exactly the reverse method employed in making the original negative. The original negative was made by means of a camera and lens, where the rays of light reflected the image through the lens into the camera, registering it upon the sensitive plate. Enlargements from a small negative are obtained by placing the negative in the rear of the camera, in the place formerly occupied by the plate-holder, and then permitting the rays of light to pass through the negative, then through the lens, and finally focusing on a sheet of sensitized Bromide paper, the size of the projected image de-

KNITTING

STUDY NO. 11—See Page 391 MRS. NANCY FORD CONES

pending upon the distance between the lens and the sensitized paper. The farther the paper is from the lens the greater the enlargement.

659. The amateur who has not had previous experience in making enlargements may, at first, be puzzled to know why only particular kinds of sensitized papers can be employed for the work. He has learned to use printing-out papers and gaslight papers for contact prints and may be tempted to apply his knowledge of these to the extent of using them for enlargements. But for this work printing-out papers are entirely out of the question and gaslight papers suitable only when a very strong source of light is available—in other words, a sensitized paper, possessing much greater sensitiveness to light than printing-out papers, is needed, and for this reason, in contact printing, the paper is placed in, practically, optical contact with the negative. The light passing through the negative has full play on the paper and is not weakened by having to travel any distance.

660. In enlarging, the negative is, necessarily, at some distance from the paper on which the print is made. As light reduces in strength in the ratio of the square of the distance it has to travel, it requires a very much longer time, or a very much stronger light to create an image on paper which is at any distance from the negative.

661. Certain salts of silver, notably Bromide of Silver, are much more sensitive to light than others, such as Chloride of Silver, which latter is used in the manufacture of printing-out papers. Owing to the nature of Bromide of Silver salts it is utilized for such papers as are needed for enlargement work, which, as a general term are called Bromide papers.

662. Gaslight papers, which are a species of *slow* Bromide papers, can also be used for enlarging, but as their speed is roughly fifty times less than that of normal Bromide papers they require a fifty times longer exposure. Otherwise the handling of Bromide papers and Gaslight papers for enlarging is virtually the same.

663. Bromide papers compare in speed with very slow dry plates, consequently, need to be handled with all the precautions as to light fogging that are observed with dry plates—in other words, they must be used in a dark-room, under ruby or yellow light.

664. In the subsequent instruction the following methods of procedure for making enlargements are supplied: Using a regular enlarging lantern; employing an ordinary view camera used as an enlarging camera; using hand or pocket folding cameras; and professional methods such as are employed in studios, using the arc-light with and without condensers. We include therein, also, the use of the Aristo lamp. In all of the instruction we provide for the use of daylight as well as all kinds of artificial light, so that the reader may select any method described which will suit his or her convenience. An example of enlarging is shown in Illustration No. 15.

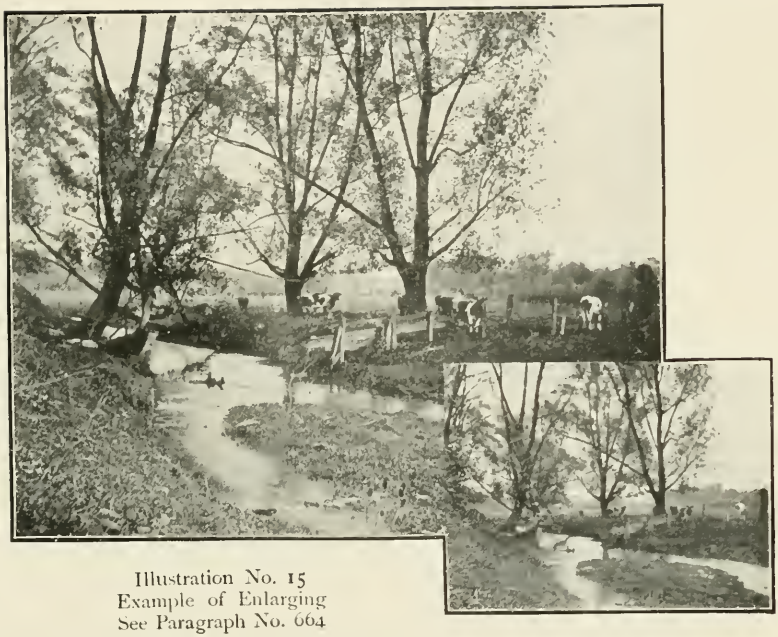


Illustration No. 15
Example of Enlarging
See Paragraph No. 664

CHAPTER XXVI.

Grades of Bromide Paper and Their Use.

665. Before entering upon the detailed instruction we will first give a description of the different grades of paper to be used. Bromide paper is a pure photograhic paper coated with a sensitive emulsion composed principally of pure bromide of silver and white gelatin, only enough gelatin being used to cause the sensitive silver salt to adhere to the paper. The Bromide of Silver emulsion is so compounded that it will give a pure black tone when exposed to light for a brief period of time and then developed, the unexposed portions of the paper remaining perfectly white except in the papers of the class of Royal Bromide, which has a delicate cream tint.

666. **Grades of Paper.**—Bromide papers are manufactured in different grades and qualities, ranging from a heavy rough to a thin smooth in the matte surfaces and in the glossy papers from the enameled to the matte-enamel. Each of these various kinds of Bromide papers are generally made in two varieties of emulsion marked either "hard" or "soft." "**Hard**"—strong contrasts for use with soft or flat negatives. "**Soft**"—soft and rapid for use with hard or strong, contrasty negatives. The papers manufactured by the Eastman Kodak Company are probably the best known and can be used as a standard.

667. **Platino-Bromide paper** gives Platinum-like results. It has a fine surface and is best adapted for enlargements from original negatives—not copies. This paper is made in two weights—A, thin smooth; C, heavy rough. The C, heavy rough, is intended for enlargements of more

than ordinary size which are to be spotted or finished in crayon, pastel, India-ink, water-colors or oil.

668. **Standard Bromide paper** is adapted for all kinds of enlargements, particularly copies on which crayon or pastel work is to be done. The emulsion is coated on three different weights of paper—A, thin smooth; B, heavy smooth; C, heavy rough.

669. **Matte-Enameled Bromide paper** gives rich carbon blacks and has a smooth, velvety, matte surface, tinted just enough to lend warmth to the high-lights and half-tones, giving an effect not heretofore obtained with Bromide papers. When used with a negative made direct from a subject—not from a copy—enlargements can be made that closely resemble matte contact prints.

670. This paper gives excellent sepia tones, and is especially recommended when it is desired to make plain prints without hand work for enlargements 16 x 20 and under. It is furnished in medium-weight only.

671. **Enamel Bromide Paper.**—A glossy Bromide paper, which, when used with direct negatives—not copies—gives enlargements closely resembling glossy contact prints. It affords excellent sepia tones and can be finished in water-colors washed in by brush or with the air-brush. When squeegeed to a ferrotype plate a gloss is produced which is fully equal to that produced by the glacé process. It is furnished in medium-weight only.

672. **Royal Bromide Paper.**—Sepia-toned enlargements made through bolting cloth on Royal Bromide paper have the softness and beauty of rare old etchings. Owing to the broad effects we do not recommend this paper for pictures smaller than 8 x 10 inches.

673. Negatives having dark, sketchy backgrounds, deep shadows and snappy high-lights will combine to produce an effect with Royal Bromide not obtainable with any other Bromide paper.

Royal Bromide is not intended for use when vignetted prints with white backgrounds are wanted, for it is coated on paper having a delicate cream tint, the yel-

lowish cast in the high-lights harmonizing beautifully with dark backgrounds, but not adapted to vignettes. This is made in two varieties, rough and smooth.

674. **Velvet Bromide.**—This product is suited to negatives having broad shadows, the slight sheen of the semi-gloss surface giving the enlargements from such negatives a life and brilliancy which is highly pleasing. Velvet bromide is especially suited to enlargements from amateur or landscape negatives.

675. **Keeping Qualities of Bromide Papers.**—Bromide paper has exceptional keeping qualities, its life being about the length of any of the gaslight papers. It should be kept in a dry, well ventilated cupboard or drawer.

676. **Purchasing Paper.**—For the convenience of consumers these papers are put up in all standard sizes, and for the amateur, or the photographer who is using small quantities we would advise the purchase of these cut sizes. They are put up a dozen in a package, the smallest of which is 2½ x 2½ and the largest 40 x 72 inches. For those who are using large quantities we would advise purchasing in rolls. They are put up in 10-ft. lengths 24½ inches wide, and in 10-yd. lengths, of four different widths,

20 inches wide
24 inches wide
30 inches wide
41 inches wide

When ordering always specify whether you want the "hard" or "soft."

677. **Sensitiveness of Bromide Paper.**—While Bromide paper is considerably more sensitive than gaslight or developing papers, such as Velox, it is only about half as sensitive as a rapid dry plate; therefore it can be handled in a fairly strong yellow or ruby light, but never in extremely weak daylight, as this would fog it. Daylight coming through two thicknesses of postoffice paper is a perfectly safe light to work by. When artificial light, such as gas, or kerosene, is used, one thickness of postoffice paper over the light will be sufficient and perfectly safe.

678. **Enlargements on Special Velox Paper.**—Very excellent results are obtained by enlarging on special velox. This paper, being much slower than the bromide, requires about *fifty to sixty times* the exposure of that necessary for bromide paper.

679. **Enlargements on Nepera Paper.**—Nepera is a developing paper, and, like the velox, is much slower in speed than the bromide paper, but it possesses qualities that recommend it particularly to the professional making high-class portrait enlargements. Nepera is unequalled as a paper for enlargements from professional portrait negatives, as it fully preserves all the detail and delicacies of gradation of the original negative. Royal Nepera produces exceedingly rich sepia tones when redeveloped. The great variety of surfaces and grades of the Eastman permanent Bromide and Nepera papers enable the photographer not only to duplicate any effect to be had in contact printing, but also in many instances to greatly improve the quality by means of simple manipulations during exposure and development. Enlargements from good negatives made on the proper grade of paper will equal in every respect a contact print made from an enlarged negative, and with a great saving of time and money. In fact, many photographers prefer making all their negatives of uniform size, and when they receive orders for large prints, enlarge from the small negatives with equally satisfactory results.

680. The same developer can be used for Velox or Nepera enlargements as for bromide paper, but an acid hypo bath should be used for fixing, as follows:

Water	2 qts.
Hypo Sulphite of Soda	1 lb.

When thoroughly dissolved, add 6 ozs. of the hardening solution, prepared as follows:

Water	10 ozs.
Sulphite of Soda (desiccated)	1 oz.
Commercial Acetic Acid	6 ozs.
Or 1½ ozs. Glacial Acetic Acid	
Powdered Alum	2 ozs.

Prints when developed should be quickly rinsed and immersed in the hypo bath. A freshly made acid hypo bath will fix prints in twelve minutes.

CHAPTER XXVII.

Brief Instruction for Bromide Enlarging With the Enlarging-Lantern.

681. Enlarging-lanterns are constructed for use with artificial light. Either electric, gas or kerosene lamps can be used. Illustration No. 16 shows the Ingento Enlarging-Lantern. The end of the apparatus containing the lantern is fitted with large Russian iron light chambers which accommodate any of the artificial lights you may wish to employ. The bellows and lens-board move on rigid and finely nickeled rods. The frame-stage which receives the negative-carrier is open on the top so that it can be used with negatives larger than those to which the lantern is especially adapted, and as it is perfectly square the negative can be used vertically or horizontally.

682. The condensing lenses are located between the negative-carrier and lantern. When using the enlarging-lantern all that is required is an ordinary room made perfectly dark, a table upon which to place the lantern, and another small table upon which to place a good sized box to be used as an easel, which will support the sensitized paper. The side of the box facing the lantern should be covered with white cardboard, which may be marked off with a pencil in various sizes, 8 x 10 to 16 x 20 inches. These markings or guides will aid you to obtain the correct size enlargement desired.

683. To operate the instrument, light the lantern and then place the negative in the negative-carrier. Place the table containing the box which is to carry the Bromide paper (and which hereafter will be referred to as the easel) within three feet of the lens and directly in front of and

square to it. To obtain a focus, rack out the bellows until the image appears sharp on the white card on the easel. If the image is too small place the easel farther away. The

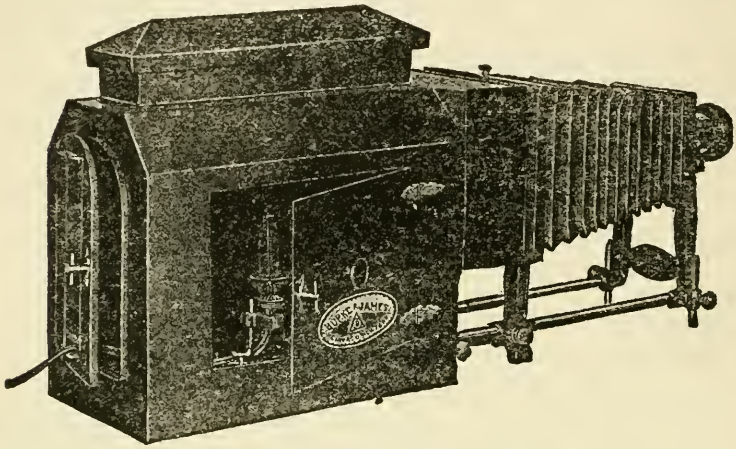


Illustration No. 16
Ingento Enlarging-Lantern
See Paragraph No. 681

size of the image depends upon the distance between the easel and the lens.

684. When you have obtained the focus, cap the lens and with thumb-tacks attach the Bromide paper to the easel. You are then ready for the exposure, which will vary from 20 to 60 seconds according to the light employed and quality of the negative used.

685. After the exposure the print is removed from the easel and is ready for development, which we will treat of later.

CHAPTER XXVIII.

Daylight Enlarging With a Pocket Film Kodak.

686 The Folding Pocket Kodak is arranged before a window in exactly the same manner as a larger camera, but as it is not provided with a flat-bed to rest on any flat surface, a frame must be constructed to hold it in place against the window. A very convenient frame, to which the kodak is fastened by stout rubber-bands, is shown in Illustration No. 17. This frame is attached to a board, fastened across the window and containing an opening not larger than the back of the kodak.

687. Other pocket film cameras, which are made with drop fronts providing a flat bed, can be used of course, in the same manner as the regular hand or view cameras.

688. The frame, as seen in Illustration No. 17, is easily constructed, consisting of a box made of one-half inch pine lumber, about 3 inches deep, by the width of the camera and the length of the film employed, with a projection on the front extending 1½ inches at the top and 2 inches on the bottom. Attached to the bottom is a wooden strip 3 inches wide used as a shelf upon which the end of the camera rests, which is held in position and in close contact with the frame by means of heavy rubber-bands slipped over the extension and camera—both at the top and at the bottom. The rear of the box, which is intended to face the window, contains grooves to receive the negative. The inside of the box is stained dead black. This extra box attachment also serves to give more focal length to the camera and thus enables you to make larger pictures with it than without it.

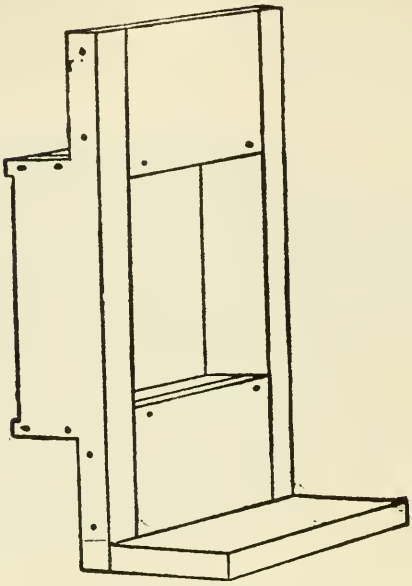


Illustration No. 17
Enlarging Frame to Hold Kodak
See Paragraph No. 686

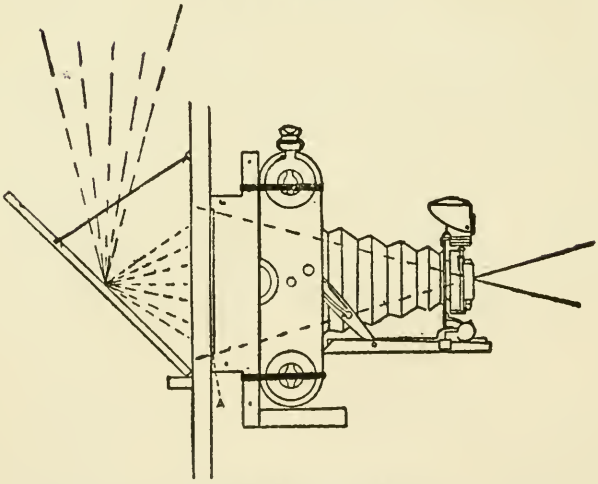


Illustration No. 18
Kodak Attached to Frame
See Paragraph No. 689

689. Illustration No. 18 shows a camera and holding-frame in profile and illustrates the method of holding the camera in position with rubber-bands.

690. To place the negative in position for enlarging, procure two pieces of plain glass to fit the opening, A, in the holding-frame. See that the glasses employed are with-

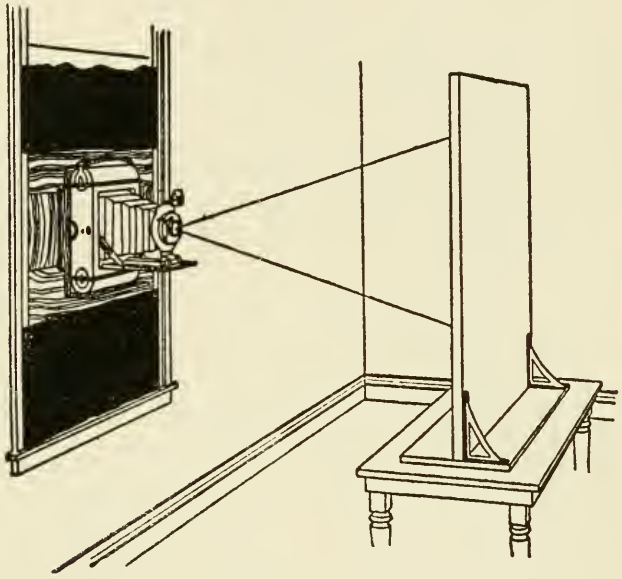


Illustration No. 19
Kodak in Position
See Paragraph No. 690

out flaws and perfectly clean. Place the negative to be enlarged from between the glasses, binding the ends of the glasses with a small piece of adhesive tape to insure the film negative lying flat. Then insert the glasses and film in groove A, with the negative upside down and with the dull (film) side facing into the room. Next remove the back from the camera (as it will not be used while enlarging) and place the camera in the holding-frame, as shown in Illustration No. 19, securing it to the frame with heavy

rubber-bands. By using rubber-bands the camera is held in position without danger of marring or scratching the leather covering.

691. In many instances, the actual picture is contained in a comparatively small portion of the negative and in such cases all undesirable portions may be covered with a mask of black paper. In order to be certain that no light enters between the camera and the holding-frame an opaque cloth should be wrapped around the camera and frame.

692. **Size of the Enlargement.**—The size of the enlargement depends upon the focus of the lens and the distance of the easel or copying-board from the negative.

693. **Lens.**—Any lens that will make a good negative may be used for enlarging. The proper size (focal length) of the lens depends entirely upon the size of the negative to be enlarged from and not at all upon the size of the enlargement to be made.

694. The lens that made the negative will be suitable for making the enlargement. If the lens will cover the negative it will make an enlargement from it of any size. The regular lens fitted to any hand camera is suitable for enlarging from negatives made with it.

CHAPTER XXIX.

Daylight Enlarging With the View or Hand Camera.

Detailed Instruction.

695. **Preparing the Apparatus.**—To prepare your apparatus for daylight work is a very simple matter. Select a room with a window facing north, if possible, a room that has only one window in it. If there is more than one window, all except one must be covered with black opaque material and made absolutely light-tight. The accompanying Illustration No. 20 will serve to show how to construct, very cheaply, an enlarging apparatus with an ordinary view camera converted into an enlarging camera. First procure two boards ½ in. thick, about 18 in. wide, and as long as the width of the window. Attach one of these boards to the sill of the window that you propose using, fastening it so that it will act as a shelf. Fasten the other board across and against the window sash with the lower edge resting perpendicularly on the shelf. Next place your camera on the center of the shelf with the ground-glass against the upright board, and with a pencil mark an outline for an opening in this board just a little smaller than the outside measurements of the camera. Cut out this opening; then tack a heavy opaque cloth (large enough to cover the camera) around the opening so as to form a sleeve. This will close all openings around the edge of the ground-glass and camera-back.

696. When the balance of the window is covered with heavy press-board or opaque cloth no light will be admitted into the room except that which comes through the ground-

glass and lens. The camera should be placed within an inch of this opening, allowing for the thickness of the plate-holder between the ground-glass and camera and should

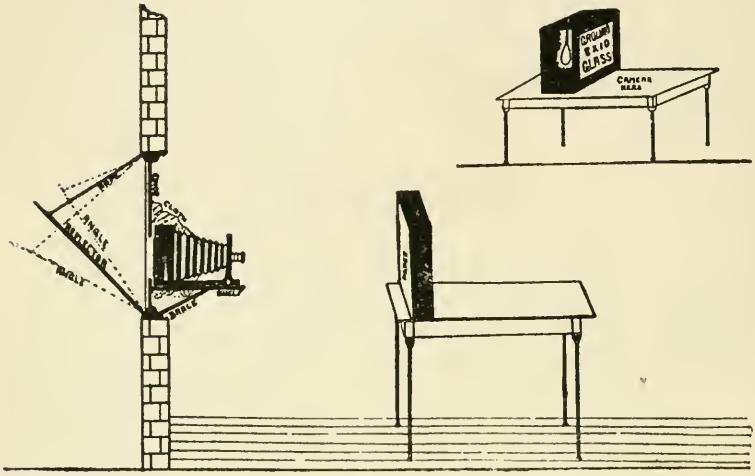


Illustration No. 20
Enlarging Box for Daylight
See Paragraph No. 695

be covered with the cloth so that no light enters except that which passes through the back of the instrument. Before attaching your camera to the window and shutting out all light you must fasten a reflecting-board about 18 x 24 inches on the outside of the window, and six inches below the bottom of the opening in the board. Cover it with white cardboard, and fasten a cord to each side of the center of the outer edge of the board and to each side of the window-frame, to hold the board in place.

697. Where the window, at which the camera is arranged, is not obstructed by buildings or trees which interfere with the direct passage of the light through the negative and lens, no reflecting-board is needed. But, where a clear view to the sky from the window is not to be had, as for instance in cities or closely built up districts, the

light from the sky must be reflected into the camera at such an angle that the rays pass through parallel to the axis of the camera and lens. This can only be accomplished by placing the reflecting-board at an angle of 45 degrees

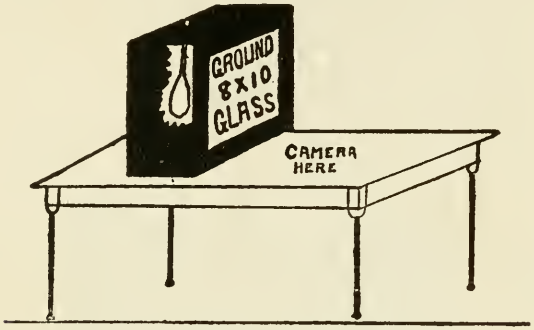


Illustration No. 21
Enlarging Apparatus for Artificial Light
See Paragraph No. 698

to the window. A window should be chosen into which the sun does not shine.

698. **Preparing Apparatus for Artificial Light.**—Bromide enlargements can be made equally well at night by the use of artificial light, although the necessary exposure will be considerably longer. In this case you can use your regular dark-room. The accompanying Illustration No. 21 will serve to show how to prepare a box for the use of electric light. A good, large box should be used in order to keep the bulb cool, and the hole in the top of the box, through which the electric cord enters, must be protected by a bushing. This can be done by using a 2-inch piece of rubber hose or tubing. Fit this in the top of the box and pass the electric cord through it. A good plan is to also have a small door in the back of the box, through which you can turn the light on and off. To make this box absolutely fire-proof and safe, line it with asbestos, more especially if it is rather small. If it is a fair sized box, line it with tin and it will be perfectly safe, while the tin will act as a

reflector and increase the strength of light. The front of the box should be fitted with a sheet of ground-glass. Set the box on a table and then place the camera in front of the ground-glass, exactly the same as when using the window.

699. In case your dark-room is very small and you have no electric light but must use some other artificial light (lamp light for example), then prepare your dark-room so that you can place your lamp on the outside of the door or one of the walls, about three feet from the floor, with an opening cut in the wall large enough to receive the ground-glass or negative space of your camera. Build a shelf both on the inside and outside of this opening, the one on the inside to hold the camera and the one on the outside to hold the box containing the artificial light.

700. The box containing the light must be lined with either asbestos or tin. This lining will answer three purposes—it concentrates the light, acts as a reflector, and also makes the box fire-proof. A ground-glass must be fitted in the one side facing the dark-room. If it is possible, use an opal glass in place of ground-glass. This is a milk-white glass, with which, you will find, you will produce a whiter and more evenly distributed light. This ground-glass or opal glass is to take the place of a condenser and if your light is placed far enough away from the ground-glass it will diffuse evenly. The correct distance between the light and the ground-glass is twice the diagonal of the negative employed. This extra ground-glass is not necessary when using the ground-glass which is on the camera.

701. Any kind of light can be used. If electric light can be had then drop two 32 candle-power incandescent lights into the box, one in each corner and some little distance to the rear so as to bring the lights away from the ground-glass as far as possible. If no electric light can be had, two gas jets or two kerosene lamps will do. If the latter are used it is necessary that there be two openings at the top of the box to give draught to the chimney. A low lamp is best as the flame will be centered more evenly.

702. Where electric light is used and the dark-room is sufficiently large, there will be no necessity of cutting a hole in the wall and placing the light on the outside, as the box containing the electric light can be made entirely light-tight and can be used inside of the dark-room. If gas or kerosene light is used you could not close the box entirely as both must have some air to burn well and give white light.

703. When using kerosene we would advise placing a piece of camphor, about the size of a walnut, into the oil.

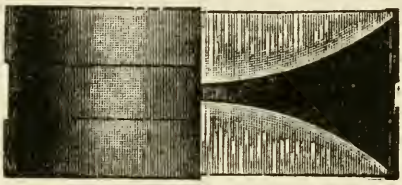


Illustration No. 22
Condensing Lens
See Paragraph No. 704

This camphor will cause the oil, when burning, to give a whiter—more actinic—light.

704. **Condenser.**—This is a very large lens and is used in place of the ground-glass. It consists of two plano-convex lenses mounted with the convex faces inwards. See Illustration No. 22. This lens collects all the rays of light together, passes them through the negative and brings them to a focus in the lens which projects the image. Large condensers if made of fine glass are quite expensive, but a cheaper grade can be procured, producing equally as fine results if a sheet of very fine ground-glass be mounted between the convex surfaces of the two lenses. This, however, is intended of course, only for large condensers and where electric light is used. Electric light gives a stronger light than is actually required; the diffusion caused by the ground-glass therefore is no detriment.

705. As all the light must come through the con-

densing lens and the negative from which the enlargement is to be made, the diagonal of the negative must not be any larger than the diameter of the condenser; otherwise the corners of the negative would be cut off. For all negatives up to 5 x 7, a 9-inch condenser will answer; a 10-inch condenser would be better. The latter size is more generally used than any other. The size of the condenser has nothing to do with the size of the enlargement. It has only to deal with the size of the negative you wish to enlarge from, as it collects and concentrates the light upon the negative and distributes it evenly. Any size enlargement can be made with any size condenser so long as the condenser is large enough to cover the negative from which you are enlarging. Where a condenser is used in place of the ground-glass the light, being concentrated, is so much stronger that the exposure necessary for the enlargement is reduced considerably. Any kind of light can be used with the condenser exactly the same as if the ground-glass were used. Electric light, however, is preferable to lamp light and if incandescent bulbs are used the box, as shown in the cut, can be arranged to hold the condenser in place of the ground-glass.

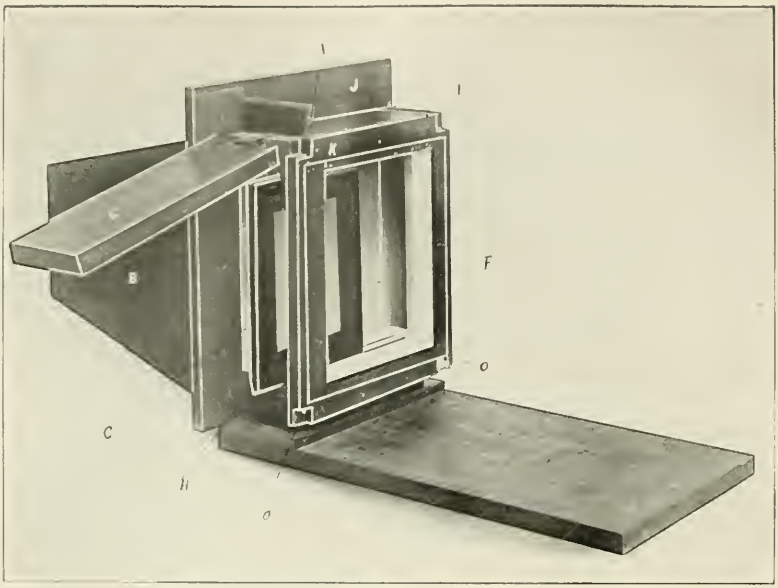
706. **Enlarging Easel.**—On a small table or stand place a box a little larger than the size of enlargement you are going to make. Fasten this box down by some weight (place some heavy material inside) so that it will be perfectly rigid. This box will serve as an easel on which you can fasten the Bromide paper. The side of the box facing the camera should be covered with a piece of white cardboard, or cotton cloth which should be soft and perfectly smooth. A good plan, where cotton cloth is used, is to dampen it before you tack it to the box and then use plenty of tacks. When it becomes dry it will be as tight as a drum-head.

707. A more elaborate apparatus and a style usually used in the professional studios can be constructed, as shown in Illustration No. 6. The easel-board can be made to slide up and down in the frame and is held in position at

any desired point by means of a flat spring attached to each side of the board and working in the groove between the board and the upright standard. The base of the easel can also be mounted on a track if desired for sliding backward and forward, nearer or further away from the camera, but this is not necessary and is not very generally used except in specially prepared enlarging rooms that are used for no other purpose. Easels may also be purchased from any photographic supply house.

THE SPLINTER

STUDY NO. 12—See Page 391 MRS. NANCY FORD CONES



Home-Made Apparatus without Camera

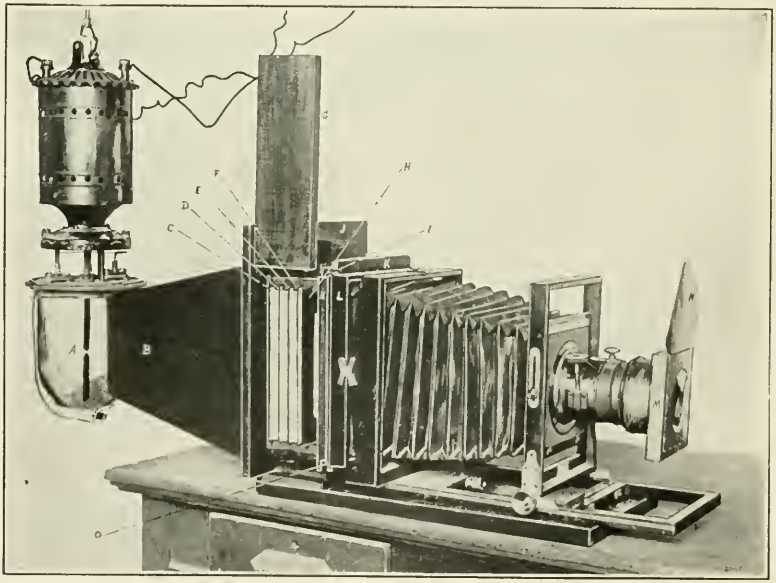


Illustration No. 23—See Paragraph No. 708
Home-Made Enlarging Apparatus

CHAPTER XXX.

Home-Made Enlarging Apparatus Without Condensers.

708. **Introduction.**—If one does not desire to go to the expense of purchasing a regular enlarging camera, it is possible to construct an enlarging apparatus that will answer the purpose and give practical and satisfactory results. The enlarging box may be built in a manner similar to the one shown in Illustration No. 23. For the camera you can use your regular view camera by removing the ground-glass frame, and by means of the brass clamps that attach the ground-glass frame to the camera, you can attach the camera to the enlarging box. Your enlarging box may be made stationary, if you so wish, and your camera made detachable so you can use it for other purposes. By merely unhooking it from the enlarging box and again attaching your ground-glass frame you have your view camera complete. For this enlarging box it is advisable to select wood that will not warp nor split easily. Of the cheaper woods obtainable, bass wood is recommended.

709. The cone (B) is made of one-half inch material, and for the 8 x 10 camera this cone should be made of four pieces of wood 15 inches long, 12 inches wide at the larger end, and 6 inches at the smaller. In fastening these boards together use No. 4 finishing nails, or long, thin brads. When the cone is completed the inside of the small end will measure 5 x 6 inches, and the cone should be fastened to the body of the enlarging apparatus so that the long way will be upright.

710. Now construct a frame (J) of either half inch or inch material, to be fastened securely to the large end of the cone. This is to act as a flange or casing to fit against the wall, and should, therefore, extend two to four inches beyond the cone, while the inside opening should be 10 x 10

inches in size. After fastening this flange or casing to the large end of the cone, construct a box 4 inches deep, which is to hold the ground-glasses (C, D, E and F) and the negative (H). The inside measurement of this box should be 10 x 10$\frac{1}{16}$ inches, the $\frac{1}{16}$ of an inch being allowed to give a little play for inserting the ground-glasses and negative. In this box provide four grooves for the inserting of ground-glasses and one groove for the negative. A door (G) should be placed at the side and hinged at either top or bottom, as shown in the illustration.

711. The ground-glasses should, of course, be next to the cone, in order that the light may be diffused before reaching the negative. The grooves are supplied by nailing small strips of wood, $\frac{3}{16}$ x ½ inch in size, both on the bottom and the top of the box, $\frac{3}{32}$ of an inch apart, or far enough apart to permit of the thickest ground-glass or negative being easily inserted and withdrawn. A narrow frame or casing (K) should now be fastened to the edge of this box, to which the camera (L) may be fitted. This should be carefully done, in order that no light escapes between the box and the back of the camera. A small flange may be readily attached to this box so as to fit into the back of the camera in exactly the same manner as the ground-glass back that comes with the instrument. In order to permit of enlarging from an 8 x 10 negative the opening in this flange should be $\frac{1}{16}$ inch smaller than 8 x 10 inches.

712. A base-board should now be fastened to the whole apparatus, as shown in the accompanying illustration, so the camera and the balance of the apparatus will fit together perfectly. A careful study of the illustration will enable anyone, handy with tools, to construct this instrument at a cost of not over $1.50. An 8 x 10 view camera is an excellent one to employ in conjunction with this home-made instrument, for with this size camera any size negatives may be enlarged from, up to, and including, 8 x 10 inches.

713. **Full Explanatory Details of Home-Made Enlarging Apparatus Without Condensers.**—(A) electric light;

(B) cone of enlarging apparatus; (C, D, E, F) the four ground-glasses in position; (G) door—hinged at the top; (H) 8 x 10 kit for 5 x 7 plates. 8 x 10 plates are inserted in this same slot without using any kit; (I, O) the upper and lower catches which are on back of the camera, which originally held the ground-glass frame in position, but now utilized to hold the back of the camera to the enlarging box; (J) casing or flange between the cone and the box containing the ground-glasses; (K) flange between box containing ground-glasses and back of camera; (L) back of camera; (M) frame for holding orange colored glass; (N) orange colored glass partly withdrawn.

714. When completed the exterior of the cone and the balance of the apparatus should be painted black, while it is preferable to paint the inside of the cone white, so as to reflect all the light possible onto the ground-glass.

715. If this apparatus is made for 8 x 10 negatives, a kit should be constructed to hold 5 x 7 and smaller negatives. A regular nest of plate-holder kits may be purchased from any supply house, and these used when it is desired to enlarge from negatives smaller than 8 x 10 inches. The largest kit is slightly beveled on the upper and lower edges to fit the grooves, and 8 x 10 negatives are slid in the grooves without a kit.

716. If it is necessary to secure full detail and have a perfectly even distribution of light over the entire surface of an 8 x 10 plate, four ground-glasses should be used. When smaller negatives are employed, two, or even one, ground-glasses usually will be sufficient to give the proper distribution of light. The amount of diffusion necessary depends entirely upon the character of the source of light.

717. **Use of Camera with Daylight.**—If desired, this apparatus can be used for daylight work—*i. e.*, daylight may be employed as the source of illumination. In this case, the window will need to be blocked leaving an opening in it 8 x 10 inches in size. The cone will need to be removed and the balance of the apparatus placed firmly against the opening in the shutter. The same number

of ground-glasses should be used, however, as when artificial light is employed.

718. Always strive to have the light entirely unobstructed. If a building should be opposite your window there would be danger of uneven illumination and it would, in that case, be advisable to place a white cardboard, two feet square, just outside of the window, at an angle of 45°, so as to reflect light from the sky onto the opening. This will give perfectly even illumination.

719. While the professional photographer should have an enlarging apparatus 8 x 10 inches in size, the amateur, or those who have no large camera and desire to construct a smaller apparatus, can do so by using the regular hand camera in place of the view camera and following out the above plans and suggestions. When the small camera is used and artificial light is to be employed the cone will not need to be so long, as the length of the cone depends upon the size of the largest negative from which it is desired to make enlargements. The light, however, should always be as far from the negative as twice the diagonal of the negative.

720. **Lens Screen.**—In making enlargements it is very desirable to have some arrangement that will facilitate the correct placing of the paper on the easel. A simple attachment can be constructed on the lens, similar to the one shown in Illustration No. 23 (M and N), which permits of an orange or ruby glass being placed in front of the lens, through which sufficient non-actinic light will pass to enable you to see what you are doing. After the image has been sharply focused on the easel, the ruby or orange glass is inserted in the groove, and sufficient light will come through this screen to form a slight image on the easel, yet not enough to fog the paper. The attachment shown in the accompanying illustration is made of a wooden block, with a hole cut in the center, and this is fitted over the lens. A groove in the front of the block is made and the yellow glass inserted in this. When the exposure is made this glass, of course, is withdrawn and again inserted at the end of the exposure.

CHAPTER XXXI.

Bromide Enlarging—Detailed Instruction.

721. **Lens for Enlarging.**—For all general work the regular lens (rectilinear or anastigmat) may be used for enlarging; all that is required is, that the lens be of sufficient size to cover the plate to be enlarged. Fortunately for the amateur who possesses only a hand or view camera fitted with a rectilinear lens, this is in every way suitable for enlarging; in fact, should be used in preference to others for the enlarging of groups, landscapes, mechanical drawings, etc., and it will work equally as good for portraiture, with the exception that it does not work quite so quickly. This is because it has not as large an aperture. For full and half-length figures it is quite as rapid, because, for this purpose, with a portrait lens it would be necessary to stop down considerably in order to get the entire image sharp. Any lens that will make a negative can be used for enlarging, and the proper size of lens depends almost entirely upon the negative to be enlarged from, and not at all upon the enlargement to be made. If the lens will cover the negative it will make an enlargement from it of any size.

722. A good rule to follow is to use for your enlarging lens the same lens, or the same size lens, that was used to make the original negative from which you are going to make your Bromide enlargement. For portrait enlargements to be made from 5 x 7 negatives, and under, a half-size portrait lens will be found suitable. This lens can be worked nearly wide open for bust pictures, but will have to be stopped down for half or full-length figures.

723. **Quality of Negative Best Suited for Bromide En-**

larging.—Any negative from which a good, snappy, brilliant print can be obtained in contact printing is suitable for Bromide enlarging. By exercising a little care in selecting the proper grade of paper, using "hard" or "soft," as the case may require, almost perfect prints can be produced from harsh and contrasty, or very thin negatives. If only one grade of paper is used, then the difference in quality of negative must be overcome in the exposure and development. A hard, contrasty negative, for instance, must receive a longer exposure than a thin, snappy one, and *vice versa*. All negatives should be carefully spotted, and portrait negatives retouched before enlarging from them; for remember, all blemishes or defects will be very much more noticeable in the enlargement. Also bear in mind that a very badly discolored, yellow negative will necessitate a great deal longer exposure, as the yellow image will have but slight effect on the sensitiveness of the paper; hence the extra long exposure necessary.

724. **Placing Negative in Position.**—We will now suppose that you have your enlarging apparatus prepared for enlarging. Having selected your negative, the next step is to place it in position for enlarging. The negative is placed in the negative-holder upside down, and inserted in the camera with the film side facing the lens, unless you want the image inverted, when, of course, the negative may be placed glass side to the lens. The quality of the enlargement is exactly the same, no matter which way you insert the negative.

725. **Focusing.**—Before focusing, see that your camera and negative are in position, and the room in total darkness, and that the only light coming into the room is passing through the negative and then through the lens. By pushing your easel or stand—which is covered with white cloth or cardboard—forward or backward, you can obtain any size enlargement you want. When you have determined this, focus in the usual manner, by either racking your lens forward or backward. If the lens cuts the image perfectly sharp, and a rectilinear lens will do this, as a rule, you are

then ready to place your sensitive Bromide paper in position. If you find, however, that the lens does not cut the image sharply, it will be necessary to use a stop. Never use a stop or diaphragm smaller than is absolutely necessary. Next place the cap on the lens. This cap should be fitted in the following manner:

726. Cut out the front of the cap, leaving about ¼ inch margin around the entire edge. Into this fit a piece of yellow or bright ruby glass. You will find that the image will show on the screen colored yellow or ruby according to the kind of glass you have in the cap. You will also find that the light coming through the colored glass will not affect the paper. After capping your lens attach the paper in position, with thumb tacks, being guided by the colored image on the screen. We would advise the use of Kodak push-pins, as they are made of glass and therefore would not leave so large a white spot on the print. With the paper attached to the board you are ready to make the exposure.

727. **Making the Exposure.**—Before making an exposure on a full size sheet of paper we would advise using a test strip. Take a sheet of Bromide paper and cut it into strips about three inches wide and experiment with one or two of these to obtain the proper length of exposure. In attaching the test strip to the board place it in a position so as to cover portions of the negative containing highlights, half-tones and shadows. This will give you a fair test on all portions of the negative. In this way you will avoid waste. After you have obtained the proper exposure, make a record of the number of seconds on the margin of the negative, which record will be your guide on all future exposures from this negative. The exposure varies with the density of the negative, as well as with the quality and strength of light. A thin negative with sufficient strength to make a good print generally will receive sufficient exposure in one second in diffused daylight, or twenty seconds at a distance of 12 inches from a No. 2 kerosene burner. Very thin negatives should be printed by weak yellow light; in fact, it is better to print weak negatives by artificial light,

as the artificial light always gives more contrast. In this way a fairly strong, vigorous print may be obtained from a negative that would otherwise be too thin and flat. Thin, weak negatives should also be printed on "hard" paper; strong, intense negatives should be printed by daylight, or, at least, by strong artificial light, and on a "soft" grade of paper.

728. The correct time of exposure depends on the negative, the time and brightness of the day, or, if made by artificial light, the strength and color quality of the light. A good way to determine this is to take one of your test strips, tack it on a screen in the manner stated above, then with an ordinary card, cover all but ⅓ of the strip; take off cap and expose 5 seconds; move the card ⅓ more and give this 5 seconds; then give the whole strip 5 seconds, thus exposing the first part 15 seconds, the second 10 seconds and the third 5 seconds. Develop the strip and one of these exposures will be a good guide to the correct time. Bear in mind that daylight is about twenty times faster than lamp light.

729. The image must be made to register properly on your box or enlarging easel, by sliding the negative in the holder and by raising or lowering the front of the camera carrying the lens, providing your camera is supplied with a rising and lowering front.

730. **Note.**—In case condensers are being used, the lens must remain on the axis of the condenser and the vertical adjustment obtained by raising and lowering the easel board.

731. **Preparing Developer.**—

Metol-Hydroquinon Developer.

Hot water	50 ozs.
Metol	¼ oz.
Hydroquinon	1 oz.
Sulphite of Soda (Anhydrous)	3¾ ozs.
Bromide of Potassium	60 grs.
Carbonate of Soda	6¼ ozs.

Note: Ortol may be substituted for metol, using the same quantity.

Dissolve the chemicals in hot water, and in order given, and let stand to cool, when the solution is ready for use. To develop, take

Stock Solution .....1 oz.
Water .....6 ozs.

732. **Fixing.**—A plain hypo fixing bath is recommended, prepared fresh each day, as follows:

Water .....32 ozs.
Hypo ..... 6 ozs.

Note: For Velox or Nepera Papers use acid Hypo bath. (See page 248.)

733. **Blisters** sometimes appear on bromide paper, but can usually be avoided by using a little common salt in the first wash water, after fixing. A positive preventative will be found by employing the following fixing bath:

Water .....64 ozs.
Hypo ..... 8 ozs.
When dissolved, add
Metabisulphite of Potash.....¼ oz.
Alum .....¼ oz.

The prints should be thoroughly immersed in this bath, to insure proper hardening of the film.

734. **Trays.**—It is advisable to have trays of good size, so that if you want to make large prints you will be equipped for such work. The hypo trays, especially, should be several inches larger than the prints to be finished. These trays you can readily make yourself. To do this, simply make a wooden tray and cover on the inside with oil, coach, or gossamer rubber-cloth. By folding the corners you can get a nice fit. Allow the cloth to come over the outside edges and tack with nickeled carpet tacks, tacking on the outside of the tray—*never on the inside*—as the tacks when wet might rust, and the rust will cause stains when they come in contact with the print.

735. When prints are made as large as 16 x 20 inches the hypo tray should be at least 20 x 24 inches. Mark this tray "Hypo Tray," and use it for nothing else. It is a good plan to have two different size trays for developing, 11 x 14 for small and medium-size work, and 20 x 24 for the larger sizes. Mark these trays "Bromide Developing Trays." While hard rubber trays are the best to use for developing, yet one can make his own developing trays as

well as hypo trays. *Never use trays intended for developing for anything else* and when making your own trays, before tacking the cloth to the tray it is a good plan to apply a heavy glue paste to the inside of the tray, and then to lay the oil-cloth in the box and press it down evenly on the bottom and sides. Fold the corners nicely and you will have a perfectly smooth tray.

736. **Developing.**—After you have exposed a piece of paper place it in a box where it is safe from the light and in no danger of being affected by moisture or water. A drop of water coming in contact with a piece of exposed Bromide paper will leave a white spot, for the developer will not act on the spot that is wet even if you take the trouble to dry it. If development is undertaken immediately, however, there is no apparent harm although it is best to be as careful as possible. Next, prepare your developer by diluting the stock solution according to the strength of the negative you are printing from. For normal strength negatives take, concentrated stock solution 1 oz., water 6 ozs.

737. For weak, thin negatives use 8 ozs. of water. A diluted solution gives more contrast, while a strong solution will give softer results. Prepare only sufficient solution to fully cover the print. Seven ozs. of developer is sufficient for 16 x 20 prints.

738. Next, carefully wash your developing tray and half fill it with water; then take your exposed paper and slide it under the water, face up (you are now, of course, working in the yellow light), and allow it to remain for a few minutes, or until it has become thoroughly wet, being careful to remove all air-bells, as they will cause white spots on the print. When the print is perfectly limp and lies flat, pour off the water and flow on your developer. Always use a circular movement when applying the developer to the paper, starting at the corner nearest the left hand and allowing the solution to spread over the entire print. This must be done quickly. The image should appear slowly and should develop up strong, clear and brilliant.

739. If you notice that there are parts of the print that seem to hold back in developing, which would be the

EAST IS EAST AND WEST IS WEST

STUDY NO. 13—See Page 392 WM. H. PHILLIPS

case in a contrasty negative or when there is under-exposure, rub these parts very gently with your hand, as the warmth of the hand will cause the developer to act more readily.

740. When your print is developed as far as you want it, or in other words, is done, or when the shadows are sufficiently black—and this is almost entirely governed by the exposure—pour off the developer and flow fresh water over the print. All this must be done very rapidly—quicker than it takes to tell it—as many good prints are spoiled by just a trifle over-developing, giving you a print which is too gray and dark.

741. In case of over-exposure add a few drops of a 10% solution of Bromide of Potassium directly to the developer. Be careful, however, that the Bromide does not come directly in contact with the print. Tip your tray so as to have the developer in one corner and add the Bromide; stir quickly with the hand, to thoroughly mix it with developer, and then allow it to flow back over the print.

742. After you have given the print a change of fresh water it is ready to place in the fixing-bath, which you have previously prepared according to the instructions. Slide your print into the tray, well under the surface of the bath, being careful to avoid air-bells, as these air-bells, if not removed, will cause yellow stains. If you have a number of prints slide each one under the preceding ones. In this manner you will have each and every print thoroughly covered with Hypo and you will obtain prints free from spots and stains. These should be handled over and over during the fixing, which will take about 20 minutes.

743. After they are fixed, place them in a tray of running water, being careful that the direct stream from the tap does not fall on the face of the prints, as this is liable to cause blisters and breaks in the paper. It is well to remember that a Hypo bath too strong, too cold, or too warm, is liable to cause blisters; also uneven temperature of baths and wash waters will have the same effect. A good remedy for blisters is to place the print, after it comes from the

hypo, in a strong salt bath prepared as follows:

744. **Formula for Salt Bath.—**

Water	3 qts.
Salt	a large handful

Dissolve thoroughly and immerse the prints in this bath for a few minutes, and then change to fresh water for final washing. A positive preventative for blisters will be found in the metabisulphite fixing bath. (See paragraph 733.)

Note: Clean dishes and clean hands are absolutely essential in producing perfect prints. The faintest trace of hyposulphite of soda or pyrogallic acid carried by the hands to the solution is fatal to good results; therefore one cannot be too careful to avoid any contamination.

745. **Making Prints on Enamel Bromide.**—Prints that are made on Enamel Bromide are liable to have fine black lines on them, commonly called hair-lines. These are abrasion marks and are caused by silver coming to the surface of the paper either when packing or shipping, or by something heavy being placed on it which jars the silver to the surface. These lines can be removed very easily, when the print is dry, by moistening (not wetting) a piece of absorbent cotton with wood alcohol and rubbing over the black lines.

746. **Non-Poisonous Developer.**—For those who desire to use a non-poisonous developer we would advise substituting Ortol, in like proportions, for Metol.

747. The following **Amidol Developer** will also produce brilliant prints:

Stock Solution

Water	12 ozs.
Sulphite of Soda, Crystals	3 ozs.
Amidol	½ oz.

748. For the amateur or photographer who intends making only a few prints at a time we would advise making

up only half the quantity of this stock solution. To develop use:

Stock Solution	1½ ozs.
Bromide of Potassium, 10% Sol.	8 drops.
Water	6 ozs.

749. **Washing Prints.**—Prints should be thoroughly washed for at least half an hour after fixing. If this is conscientiously done there is no reason why they should not be permanent. Even though you wash your prints in running water, pick them over occasionally so as to keep them separated and make it possible for the water to flow between the prints.

750. **Temperature.**—Have the temperature of your baths and wash waters as near alike as possible, being guided by the temperature of the water in which you are going to wash them.

751. **Vignetting.**—Very pretty and soft vignettes can be produced by the following simple instructions: Cut a hole in a piece of cardboard or strawboard the shape you want the vignette to appear (pear shape is best). The cardboard should be a little larger than your enlargement. Hold the cardboard in your hand and stand to one side of, and facing, the easel, and place this cardboard between the lens and the easel to which the paper is tacked. Uncap the lens and hold the vignetter (the cardboard with the hole in it) between the lens and easel, so as to cut off or vignette away the portion that you do not want. The vignetter must be kept moving slightly back and forth between the lens and easel, and far enough from the lens to admit light only to the portions you want. Vignette and block out the light from the parts you do not desire. Continue this to and fro movement through the entire exposure, which should not be less than 20 to 30 seconds, the lens being stopped down, if necessary, to give you sufficient time to operate the vignetter.

752. To produce a soft, even, brilliant vignette requires

some little practice, but the "knack" once acquired it becomes quite easy. Should you hold the cardboard steady without moving it you would produce a sharp outline. By moving or shaking it slightly you soften the blend. It would be advisable to first practice manipulating the vignetter with the image projected on the screen before attaching the sensitive paper thereto. This will give you an idea of what is required before making the exposure.

753. **Dodging.**—If you have some dense highlights in the negative that require printing more than other parts, and this oftentimes happens on faces and white drapery in which no detail appears, you can readily overcome this by extra printing—in other words, extra exposure on these parts. To do this, cut a 2 to 3 inch round hole in a cardboard, and holding this in front of the lens you can direct the concentrated light coming through this opening to any part you desire, thus enabling you to produce an even print. The nearer you hold it to the lens the larger the surface you expose, and *vice versa.*

754. By keeping the spot of light moving almost any amount of additional detail may be obtained locally. Remember, however, that this cardboard must be large enough to prevent the light striking the paper on any part other than where the hole is cut in the cardboard. Occasionally, in full-length portraits a hand requires less exposure than the rest of the picture. In this case a small piece of cardboard, cut to the proper shape and stuck on the end of a piece of wire or knitting-needle, can be used to screen that part of the image. Or, by sticking a round piece of cardboard (about the size of a half dollar) to the end of a glass rod, and adjusting this before the lens, over the portions to be held back, you can even the tone nicely. The glass rod, being transparent, will not affect any other portions of the print.

755. The paper, you will note, lends itself to innumerable dodges which may be practiced in a similar manner, the operator being able to see just what he is doing from his position near the easel.

756. **Correcting Distortion.**—The application of the following method for correction of views already distorted will be found of considerable interest to the serious worker: There are few photographers who have not, at some time or other, obtained negatives of street scenes with the houses looking to each other for support, or architectural studies with columns out of plumb, caused by the absence or misuse of the swing-back or rising front.

757. You may have an architectural negative or view of a building to enlarge, the lines of which, however, are faulty. The building appears, for instance, broader at the bottom than at the top. To obtain a print with the lines corrected, provide a white card large enough to cover the size enlargement you expect to make. Rule this cardboard for different size openings. If your easel will receive a 20 x 24 card, rule one opening 16 x 20, another 14 x 17, another 11 x 14, etc. Tack this card to the easel; place the negative in the enlarging camera so the lines to be corrected are in a perpendicular position, and obtain a focus. By tipping the enlarging easel or board forward or backward, you will find it possible to correct these lines. Tip the board or easel until the perpendicular lines coincide with the perpendicular lines on the board or easel.

758. You must be careful, however, when you are placing your negative in the holder for enlarging, that you place it in upside down so that the image will appear right end up on the enlarging board. By tipping the top of the easel toward the camera it brings the top considerably nearer to the negative than the bottom, and it acts like a swing-back on the camera. You will, however, notice that either the top or bottom of the picture will be very badly out of focus. To overcome this out-of-focus effect you must slightly divide the focus and use an extremely small stop and, of course, give a correspondingly longer exposure.

759. **Using Silk Bolting-Cloth.**—When using Royal Bromide paper beautiful effects of softness and breadth can be obtained by enlarging through a silk bolting-cloth screen. This screen will break up the intensity of the blacks, and

add to the breadth of the half-tones, and when prints so made are given a sepia tone they have the appearance of rare old etchings. When enlarging from a portrait it does away almost entirely with retouching. The screen may be used in direct contact with the paper, in which case the enlargement has the effect of being made on fine meshed canvas. Greater diffusion of light, however, may be obtained by placing the screen at a distance of one-fourth to one inch from the paper. The further the screen is removed from the paper the greater the diffusion of light. When using the screen you must increase the length of exposure about one-third.

760. Use the fine mesh bolting-cloth for large prints on smooth paper; the medium or coarse mesh on rough paper; while for small prints use the fine mesh. You will find, by providing yourself with a fine mesh screen, and then producing the different effects by either printing in close contact or moving the screen some distance from the paper, you can produce the different effects almost as easily as if you had a number of screens of different mesh.

761. Silk bolting-cloth, especially adapted for enlarging, can be purchased from the Eastman Kodak Company, Rochester, N. Y. It is supplied in rolls, and is securely packed in pasteboard tubes to avoid creasing. It is put up in three grades—fine mesh, medium mesh and coarse mesh. It can be purchased by the yard or in 18 x 20 inch squares. A good plan is to tack this cloth securely on a stretcher so that it will be perfectly smooth, and before using it should always be carefully dusted with a soft brush.

Don'ts.

762. Don't use an old hypo bath for fixing.

763. Don't place the prints between blotters to dry.

764. Don't use the developing-dish for fixing.

765. Don't let a jet of water run on the paper while washing; it will cause blisters.

766. Don't fail to keep the solution in motion while developing.

767. Don't rock the tray in one direction only; if you do you will produce streaky prints.

768. Don't expect to have permanent prints unless they are thoroughly fixed and washed.

769. Don't expect that the light reflected from a red brick wall will be sufficient for enlarging. Unless your enlarging window has an unbroken horizon you must use a reflector.

770. Don't use old developer on large prints for the sake of economy; use it fresh every time.

CHAPTER XXXII.

Sepia and Green Toned Bromide Prints.

Part I.

Introduction.

771. **Cold Hypo Toning Bath.**—The cold hypo toning bath is adapted for practically all grades of Bromide papers. By preparing this bath according to instructions beautiful, rich brown and sepia tones can be easily obtained.

Hyposulphite of Soda	10 ozs.
Ground Alum	2 ozs.
Boiling Water	1 gal.

First, dissolve the hypo in the hot water. For this, only enough water need be heated to dissolve the hypo. Then add the alum slowly, stirring vigorously. When all is dissolved the solution should appear milk white. The older the solution, the better it works.

772. **To Tone.**—After the prints are developed and fixed—and we would say here that the prints *must be* thoroughly fixed before toning—wash in three or four changes of water and then place in the cold toning bath, sliding the prints, face side down, under the solution, thus avoiding air-bells. When toning several prints slide them one by one underneath the first print immersed. The print, or prints, should be handled over occasionally during the first four or five hours, and may then be left in the bath over night, or until the desired tone is acquired.

773. After toning, wash thoroughly for two hours,

when they are ready to dry. They should always be toned face down. This solution can be used repeatedly by adding a fresh bath at frequent intervals. A number of prints can be toned at the same time. Spots or unevenness of tone will disappear if the print is left in a bath and frequently moved. The toning takes from fifteen to twenty hours. By heating the bath the toning can be hastened. Care should be taken, however, to keep the prints moving in the heated bath, to prevent the formation of air-bells.

774. **A yellow tone** instead of a sepia is caused by the water not being sufficiently hot when the bath was first made up. *It is absolutely necessary to have it hot, because the hot water frees the sulphur from the hypo and produces sulphurization.*

775. **A Rapid Sepia Toning Bath.**—The following formula gives a much more rapid toning bath; tones can be obtained with it in about 20 minutes. You must bear in mind, however, that a fresh bath tends to reduce the print and also gives a more yellow tone. Old baths give dark and colder (almost purple) tones. All prints dry with a slightly colder tone. No matter how long such a bath has been used it should never be thrown away, but some of it, at any rate, mixed with the fresh bath, so as to give age to the latter.

Hypo	3½	ozs.
Water	20	ozs.
Powdered Alum	130	grs.

To this add 30 grains of Nitrate of Silver.

776. Dissolve the Nitrate of Silver in a little water before adding. Heat this bath to 120° Fahr. and allow it to cool. Prints should receive two or three changes of water after fixing, and then place into this toning bath. While the prints are in the toning bath again heat the bath to 120° Fahr.

777. The first formula, although it is much slower, gives the better results, and we, therefore, recommend its use.

Part II.

Rapid Sepia Tones by the Bleaching and Re-Developing Process.

778. By this process prints may be given a rich sepia tone in from two to five minutes. Bromide prints made for sepia tones by this process should be developed a blue black. They must be thoroughly washed after fixing, in order to eliminate all Hypo, and can be re-developed either after drying or at once after washing.

779. **Permanency.**—The re-developing process gives a result which is chemically identical with that obtained by the hypo alum toning, and the print suffers no change in detail or gradation.

780. **Uniformity.**—Following the directions given herein insures absolute uniformity, and a print can be toned sepia in less than two minutes.

781. **Directions.**—Make up the stock solution as follows:

782. **No 1. Bleaching Solution.—**

Ferricyanide of Potassium	5 ozs.
Bromide of Potassium	5 ozs.
Water	120 ozs.

Place this solution in a bottle and label it Bleaching Solution.

783. **No. 2. Re-Developing Solution.—**

Sulphide (not sulphite) of Soda	5 ozs.
Water	60 ozs.

Place this solution in a bottle and label it Re-developing Solution.

784. Prepare the bleaching bath for use as follows:

Stock Solution No. 1 (Bleaching Solution)	4 ozs.
Water	4 ozs.
Aqua Ammonia	4 drops

785. Preparing re-developer for use:

Stock Solution No. 2 (Re-developing Solution)..1 oz.
Water .....8 ozs.

786. **Manipulation.**—The bleaching bath should be prepared in one tray and the re-developing bath in another. These trays should not be used for any other purpose, and each tray should be labeled. Immerse the print in the bleaching bath, allowing it to remain until only faint traces of the half-tones are visible and the black of the shadows has disappeared entirely. The image at this stage will resemble that of an undeveloped platinum print. This operation should not take longer than one minute. When the print reaches this stage rinse thoroughly in plain cold water; then place in your second tray of re-developing solution, allowing it to remain in this bath until the original detail returns. This will require from 15 to 25 seconds. When all the detail has returned, rinse under the tap for a moment, then place in running water for half an hour. After the prints are thoroughly washed, remove the surplus water by placing them between blotters; then hang up to dry.

787. **Blisters.**—Blisters are apt to occur in re-development, and usually result from the black and white print not being fixed in a fresh hypo bath. Or, if an acid hypo bath was used, glacial acetic acid may have been employed instead of *commercial acetic acid.* The blistering can usually be avoided by adding 1 oz. of formalin to each 30 ozs. of bleaching solution. A positive preventative will be found by immersing prints, after re-developing, in an acid hardening bath (omitting the hypo), in proportion 1 oz. of hardener to 16 ozs. of water. This will overcome all tendency to blister. (See page 248.)

788. **Note.**—For those who do not wish to prepare their own sepia toning chemicals, they can procure ready prepared Royal Re-developer from any agency of the Eastman Kodak Company. One package, sufficient for re-developing two hundred 8 x 10 prints, or their equivalent, costs 75 cents. When ordering these chemicals, simply ask for a package of Royal Re-developer.

THE LAST SHEAF

H. B. CONYERS

STUDY No. 14—See Page 392

Part III.

Special Tones on Bromide Paper.

789. **Bright Blue Tones.**—A bright blue tone can be obtained with the following bath:

Formula.

Iron Alum	10 grs.
Potassium Ferricyanide	4 grs.
Hydrochloric Acid	10 minims
Water	10 ozs.

After developing and fixing, immerse the prints in this toning bath until the desired color is obtained and then wash well. If the prints are subsequently fixed (returned to the Hypo Bath) a more transparent blue is obtained.

790. **Greenish Blue and Green Tones.**—By treating the blue toned print with the following bath for a short time, greenish-blue or green tones are obtained:

Sodium Sulphite	1 gr.
Hydrochloric Acid	1 drop
Water	20 ozs.

Care must be taken not to leave the print in this bath too long or it will turn black.

791. **Deep Blue Tones.**—

Iron Alum	12½ grs.
Potassium Ferricyanide.	10 grs.
Oxalic Acid—Sat. Sol.	30 minims
Ammonium Alum—Sat. Sol.	50 minims
Hydrochloric Acid	25 minims
Water	10 ozs.

Place the print in this bath until the desired tone is reached and then wash carefully.

792. **Green Tones.—**

Vanadium Chloride	2 grs.
Ferric Chloride	1 gr.
Ferric Oxalate	1 gr.
Potassium Ferricyanide	2 grs.
Oxalic Acid—Sat. Sol.	2 drs.
Water	4 ozs.

Mix the iron salts with the Ferricyanide and acid in water. Dissolve the Vanadium with 2 or 3 drops of Hydrochloric Acid and boiling water and add to the other salts. Immerse the print in this bath until the high-lights are a slate blue and then wash until green.

793. None of these blue or green tones can be considered absolutely permanent, although they will stand for quite a long time. The least permanent tones are those obtained in baths containing Vanadium.

CHAPTER XXXIII.

General Finishing of Enlargements.

794. **Drying Bromide Prints.**—If the prints are to be trimmed, you can take them from the water and hang them up by attaching spring clothes-pins to a line which you have stretched from one corner of the room to the other. Fasten these clothes-pins to the top of the prints and allow them to drain until they are dry, after which you can trim them.

795. **Flattening Unmounted Prints.**—After drying, prints may be straightened by the scraping action of a sharp edged ruler applied to the back. The corner of the print behind the ruler must be lifted as the ruler is passed along.

796. **Preventing Unmounted Prints from Curling.**—Soak your prints in the following solution:

Water	25 ozs.
Glycerine	5 ozs.

and then hang up to dry. This will prevent their curling and the prints may be mounted at the corners only—loose mounting as it is called.

797. **Mounting.**—It is advisable to mount Bromide prints solid and they should be mounted while wet. To do this, place them on your mounting-board or clean glass, face down, squeegee the water out of them and spread the paste on in the usual manner. This paste should spread easily and have good sticking qualities, as the paper is considerably thicker than the ordinary printing papers; therefore, if your paste is poor the prints will peel from the mount. Cover the prints with a clean blotter and roll into contact with a print roller.

798. **Mounting on Cloth.**—Enlargements are often mounted on cloth-covered stretchers. These stretchers are similar to the kind artists use for stretching canvas. Cover with white cotton cloth. Put the cloth on dry, stretching it tight and tacking along the edges. Lay the wet print face down on your mounting board or glass and squeegee off the surplus water; then apply the paste. Give the cloth on the stretcher a coat of paste and lay the print on the stretcher; then turn the stretcher and print over and lay face down on a clean mounting board or glass, and rub into contact with a soft cloth. Next turn the stretcher over and cover with a clean piece of cotton cloth, rubbing into contact with the hand or soft cloth. Rub under edges of frame with a paper or pallette knife and remove what paste may have come through the back of the cloth under the frame. Unless you do this the inside edge of the stretcher will show through. When dry the prints will be stretched smooth and tight.

799. **Ferrotyping Bromide Prints.**—To obtain a gloss far exceeding that obtained by any burnisher we would recommend the ferrotype process, and the resulting prints will be equal to the results produced by the troublesome glacé process.

800. **Cleaning Ferrotype Plates.**—It is absolutely necessary that the ferrotype plate be thoroughly cleansed with hot water each time it has been used. Polish with a soft cloth until plate is absolutely free from dirt or specks of any description. Next swab with a tuft of soft cloth or cotton batting wet in a solution composed of one ounce of benzine to 10 grains of paraffine. Rub dry with a clean cloth and polish with a chamois skin or very soft cloth. Use a soft camel's-hair brush to remove particles of dust or lint from the plate.

801. **Placing Print on Ferrotype Plate.**—Lay the wet print face down on the ferrotype plate. It must be in perfect contact to produce an even, uniform glossy surface. By placing your ferrotype plate and enlargement into the tray of water and then placing the print on the ferrotype

plate, while both are underneath the water, there will be less danger of air-bells gathering and better contact is secured. When the print is in position on the ferrotype plate, remove both from the water, laying the plate on a perfectly smooth surface. With a squeegee or a rubber roller, expel any air-bells that might have gathered, at the same time removing the excess water. Light rolling is better than using a heavy pressure as the latter is liable to make the prints stick in spots. When the surface (in this case the back of print) is dry and while still on the plate, apply with your brush a thin solution of white glue. When bone-dry strip the print from the plate and lay the print on the mount, the face of which must previously have been well moistened with a wet sponge, and rub or roll down with a dry blotter. Then dry, face up, free from dust.

802. **Coating Mounted Prints so as to Produce a Fine Gloss.**—A beautiful gloss may be given Enameled Bromide prints by coating the unmounted print with a solution of gum arabic:

Gum Arabic	1 oz.
Water	4 ozs.

When dissolved filter through chamois skin each time before using. Apply smoothly with a camel's-hair brush. If too thick to spread readily and smoothly, thin by adding water until you produce the proper consistency.

803. **Spotting, or Touching Up.**—Spotting should be done before squeegeeing, and the color used in spotting should be mixed with glue solution to which has been added a little alum. This will prevent the color from washing off. This spotting color, however, should be used warm. Remember that the ferrotype plates must have the highest gloss obtainable. The glue for mounting must be white and clean. Unless this kind of glue can be obtained it is advisable to use gelatine, which really is purer and better.

804. **Formula for Glue.**—

Best white glue or gelatine	3 ozs.
Water	18 ozs.

You will find this glue will keep almost indefinitely if you will add a little Carbolic Acid or Thymol. It must be heated for use, however. Soak the glue or gelatine in cold water for one-half hour, then heat to 110° Fahr. until dissolved. Strain through fine linen, when it is ready for use. Apply thinly and evenly to the print.

805. **Caution.**—The print must be bone dry before stripping or it will not strip. The mount must be evenly moistened on the face with a wet sponge. If your mounts have lithographed India-tinted centers they should be rubbed with powdered pumice stone, to produce a surface that will cause the glue to stick, and they must be carefully dusted off before moistening.

806. The ferrotype plates must be cleaned with hot water each time before using.

807. Ferrotype plates can be purchased in two different sizes, 10 x 14 and 18 x 24, and in two different weights, light and heavy.

CHAPTER XXXIV.

Difficulties—Bromide Enlarging.

808. **Mealy, Mottled Prints.**—Over-exposure and short development.

809. **White Spots.**—White spots are generally caused by air-bells gathering on the print when first placed in the water and allowed to remain while the developer is poured over the print. Wherever an air-bell appears it prevents the developer from acting on the sensitive emulsion of the paper and consequently it leaves a white spot. Particles of dirt in the developer or water settling on the print will cause white spots. Drops or splashes of water striking the print before being immersed in the water and before developing will cause white spots.

810. **Small Black or Brown Spots.**—Generally caused by some foreign metallic matter, such as iron rust, in the water or developer.

811. **Print Develops Weak in Shadows with Gray High-Lights.**—This is an almost certain sign that you did not use enough Bromide in your developer.

812. **Prints Gray in the High-lights, Having Mottled Shadows.**—Caused by over-exposing and then not carrying the print far enough in the developing. If you did carry the print far enough the print would be too black.

813. **Prints Weak and too Light.**—A certain sign that you under-exposed or possibly under-developed.

814. **Prints Strong in the Center but Weak at the Edges, Appearing Almost Like a Vignette.**—This shows that your illumination on the negative was not evenly distributed.

815. **Prints Very Light and Yellow.**—This is caused by under-exposure and prolonged development.

816. **Prints with large Yellow Stains of Different Sizes.**—This is almost a certain sign that the print was not thoroughly immersed in the Fixing Bath. If any air-bells are allowed to gather on the print when in the Hypo they prevent the Hypo from attacking the film and this will result in yellow spots.

817. **Streaky Prints.**—Caused by uneven development, or by rocking the tray in one direction.

818. **Dark Prints.**—Caused by over-printing.

819. **Blisters.**—Caused by either too warm a developer, too strong Hypo, or uneven temperatures of baths and wash waters. Give your prints a strong salt bath immediately after fixing. This will generally overcome this difficulty.

820. **Prints Developing Gray Even After Sufficient Bromide has been Added.**—This is a sure sign that your paper has become fogged either by your dark-room light not being perfectly safe or because the package was opened in daylight.

821. **Enlargement Sharp in the Center but Out of Focus at the Edges.**—Evidently your lens is not large enough to cover the plates to be enlarged and does not cut absolutely sharp to the edges unless a small stop is used. Use a smaller stop or diaphragm and the entire image will be perfectly sharp, provided the negative is sharp.

822. **Green Tones.**—Green tones are caused by over-exposure or by using too much Bromide. Discard this bath and add your Bromide to the new bath cautiously. Use small pieces of paper to test it and add only enough Bromide to cause the whites to develop clear without showing any green.

823. **Flat Prints.**—Flat prints will occur when you use too soft a paper on a flat or *soft* negative. Making your enlargement from such a negative by daylight and stopping down the lens sufficiently would produce contrast.

824. **Contrasty Prints.**—Caused by printing from a strong negative and using hard paper, or printing from a strong negative by artificial light. Give longer exposure and dodge while printing by covering up the portions that print rapidly, and allowing the extra exposure only on the parts which are strong.

825. **Sharp Vignettes.**—Caused by not keeping the vignetter in motion. Work your vignetter to and fro, up and down, back and forth between the lens and enlarging easel.

826. **Prints Refusing to Tone Sepia in the Hypo-Alum Bath.**—If this bath has been prepared properly you should have no trouble. This is extremely slow in toning, but you will find it will work better after a number of prints have been toned in the bath. A good plan is to cut up an old print and put it into the fresh bath when it is first made up. This will help to ripen the bath, give it age, and it will tone much more readily.

827. **Difficulty in Judging Which is the Sensitized Side of the Paper.**—This difficulty you will readily overcome after a little practice. You will always be able to distinguish the face of the paper by its curling in, the convex side being always the back.

828. **Enlargement Reversed from the Original Negative.**—Caused by placing the negative in the holder the wrong way. Always face the film side of negative toward the lens.

829. **Image Appearing Upside Down on the Enlarging Easel.**—This is because you placed the negative right side up in your holder in the enlarging-camera. Place it into the holder upside down and it will appear right side up in your easel.

830. **Hair Lines, Like Fine Pencil Marks, on Enamel Bromide Paper.**—These are abrasion marks and the lines generally appear rather prominently after development. If allowed to remain they would spoil an otherwise good picture. They are, however, easily removed, but from the dry print only, by gently rubbing with a tuft of cotton moistened with wood alcohol.

831. **Small White Spots and Streaks on Matte-Enamel and Platinoid Papers.**—Caused by the developer not acting evenly when first flowed over the print. To overcome this, before pouring the developer over the print, take a camel's-hair brush, or a piece of cotton and brush over the entire print while it is immersed in the water.

832. **Not Fixing Properly.**—You can tell when the prints are fixed by looking through them or upon the surface in a good strong light. The unfixed portions will be of a greenish-yellow tint. When thoroughly fixed they are clear and even throughout.

CHAPTER XXXV.

Bromide Enlarging Pointers.

833. **Prints Appear Dark in Dark-Room.**—Prints will appear darker in the yellow light of the dark-room than in daylight when finished. Bear this in mind, and do not stop development too soon.

834. **Stopping Action of Developer.**—When developing with Metol-Hydroquinon developer, the development can be stopped instantly by immersing the print in a salt bath made up as follows: One ounce of salt to 10 ounces of water.

835. **Developing Light.**—Prints must never be exposed to any light except that of the dark-room—the yellow light—until they are fixed. All the work of Bromide enlarging can be done in a strong yellow light.

836. **Rusty, Green Tones.**—Over-exposure and weak developer will produce rusty, green tones.

837. **Drying Bromide.**—Never dry bromide prints between blotting papers.

838. **Washing.**—Prints should be thoroughly washed in 30 minutes, using running water or giving the prints frequent changes.

839. **Fixing and Washing.**—It is better to thoroughly fix and wash little than to prolong the washing and not fix properly.

840. **Life of Developer.**—The same developer can be used for a number of prints in succession, but should be thrown away when it becomes slow in action. Unless you do this the resulting tones on the prints will be poor.

841. **Cracked Trays.**—Cracked, or rough surfaced developing trays will cause marks and lines on the prints.

842. **Prints Sticking Together.**—Prints should never be allowed to stick together in the fixing bath, as that is apt to cause stains.

843. **Stains from Old Developer.**—Developer which is old or used too often will cause stains.

844. **Cleanliness.**—By observing absolute cleanliness throughout the entire manipulation you will avoid stains.

845. **Master One Brand of Paper.**—Use one brand of paper; stick to it; learn to understand it.

846. **Trial Exposures.**—Making trial exposures on slips of paper will pay you in the long run.

847. **Agitate Developer.**—Keep the developer agitated by rocking the developing tray, but never rock in one direction only.

848. **Finger Marks.**—Never touch the sensitive surface of the paper; fingers are apt to be moist or dirty and these will cause stains and spots.

849. **White Light.**—Never expose the prints to any light except that of the dark-room until they are thoroughly fixed.

850. **Stains on Edges of Print.**—Stains on the edges of prints are sometimes due to old paper, but more often they are caused by paper coming in contact with the edge of the hypo tray before it is fixed.

851. **Blisters.**—Uneven temperature of solutions and wash waters or a stream of water flowing directly on the surface of the print is apt to cause blisters.

852. **Keep Prints Immersed.**—Prints should always be fixed face downward, must be thoroughly immersed, and not allowed to float on top of the hypo, as discoloration may occur. By being careful about this you will be insured of complete fixation.

853. **Temperature.**—The temperature of all solutions should be from 60° to 65° Fahr.

854. **Mixing Solutions.**—During cold weather use warm water for making up the solutions so as to have them at the proper temperature.

855. **Size of Trays.**—Remember that all dishes should be a trifle larger than the prints.

856. **Quantity of Developer to Use.**—Do not try to be economical with the developer, but use sufficient to thoroughly cover the print. In this way you will avoid markings and stains.

857. **Trays.**—Never use the same dish for developing and fixing.

858. **Grade of Paper to Use.**—Never use rough paper for a small enlargement.

859. **Hypo in Developer.**—Remember that a trace of hypo in the developing dish will surely cause stains.

860. **Clean Fixing Bath.**—In order to produce clean prints it is necessary to have a clean fixing bath.

861. **Finest Results.**—Correct exposure and full development in diluted normal developer gives the finest results.

862. **Sensitive Side of Paper.**—Remember the sensitive side of Bromide paper is the side that curls inward. If in doubt, nick the corner of the sheet with your teeth; the film side will stick.

863. **Cutting Paper.**—If you desire to cut the paper you must do so with a pair of shears, or a sharp knife, and never fold or tear it, as this leads to markings.

864. **Care of Unused Paper.**—After removing the sheet of paper from the package, always replace the remainder before doing anything else. Unless you do this, sooner or later you will fog some of the paper.

865. **Obtaining Vigorous Prints.**—Vigorous images with good, rich blacks are produced by giving short but sufficient exposure and developing with strong but slightly restrained developer.

866. **Quick Development.**—Prolonged development will cause yellow prints. The exposure should be correct so as to allow of quick development.

867. **Thorough Washing.**—Washing in running water is not so thorough as changing the prints from one tray to

another, allowing them to soak at least ten minutes in each change of water; a half dozen changes will then be sufficient.

868. **Removing Stains from Prints.**—Developer and other stains can be removed by gently rubbing the surface of the print with

Thio-carbamide	5	grs.
Nitric Acid—C. P.	5	mms.
Methylated spirits (Wood Alcohol)	½	oz.
Water	½	oz.

Always plunge the prints under water after each rubbing.

CHAPTER XXXVI.

Negative Enlarging.

Introduction.

869. There are times when one is well equipped for making good small negatives, but, has not the necessary apparatus for making large negatives. Professionals, very frequently, are handicapped for space sufficient to operate a large camera, and, in consequence, can only make small size negatives, notwithstanding the fact that they frequently have calls for larger prints from the same negative.

870. The amateur, too, very frequently has small negatives which he would like very much better if they were double or triple the size. A Bromide enlargement from the smaller negative would, in some cases, answer for a single print, or even two or three prints; but there are times when the prints are desired made on platinum, or some other printing-out paper. It is then absolutely necessary to make contact prints, and, therefore, they must be made from an enlarged negative. To meet these requirements this instruction is prepared.

871. **Methods.**—Two methods for making enlarged negatives will be described—one worked in the open light, using a large camera containing a long bellows; the other in the regular dark-room, or a small room made absolutely dark, employing the same method as for making Bromide enlargements, the dark-room serving as a large camera. The first method is employed in studios, and where large cameras are used, therefore, it will be described first.

872. **The Transparency.**—No matter which method is

employed, for all negative enlargements a positive transparency must first be made; then from this transparency make the negative. This can be done in two ways: Making the transparency by contact, then making the enlarged negative from the small transparency; or, making an enlarged transparency from the small negative, then making the large negative, by contact, from the enlarged transparency.

873. The latter method has advantages and may give better results, yet it is more expensive, as it requires two large plates. The former method requires only one large plate and one small one the size of the original. Therefore, the first method is generally used, and is recommended for your first experiments at least.

874. **Kind of Plates to Use.**—For making the transparency the best results are produced by the use of a special transparency plate, or an ordinary slow plate. Ordinary rapid plates can be used, but they will require more exactness in the exposure. For making the enlarged negative from the transparency, it is not as necessary to have a slow plate as it is in making the transparency, for upon the quality of the transparency depends the result of the enlarged negative.

875. **Quality of the Emulsion.**—Regular transparency plates are of a finer emulsion, and there is less danger of grain showing in the enlargement. The grain of an ordinary plate, when enlarged, is apt to make the enlarged negative appear coarse; the resulting print, therefore, will likely have the appearance of being made from a copy. Even slow plates possess some grain, and if an average rapid plate is used for making the intermediate contact transparency, the grain of the original negative is reproduced in the transparency, and in turn, the grain of the transparency is reproduced in the enlarged negative.

876. **Advantage of Fine Grain Emulsion.**—The advantage of using a close-grain plate for the intermediate contact transparency for enlarging will be readily seen. With a little care in the exposure, good enlarged negatives can be made with the ordinary dry plate, and where Platinum

"MARGUERITE"

STUDY No. 15—See Page 392 WILL H. WALKER

paper is used for the printing surface, the grain of the negative does not show to any great extent.

877. **Making the Transparency by Contact.**—The transparency must be made in a regular dark-room, or in an ordinary room that can be made perfectly light-tight. Before entering the dark-room, however, clean the glass side of the plate of your negative with a soft cloth, and dust the film with a camel's-hair brush, removing all particles of dust. In the dark-room, under the light of your ruby-lamp, place this negative in the ordinary printing-frame. Then, take a dry plate from the plate-box and place it on the negative, film to film; next, place a sheet of black paper over the back of the unexposed plate, and clamp the back of the frame in firmly. Be sure that the springs are good stiff ones, so that the plate and negative are in perfect contact. To avoid the clear margin on the edge of the plate, caused by the rabbit in the printing-frame, use a frame one size larger than the negative. Use a thick glass that will fit the large frame, and support the negative. Be sure that the glass is thoroughly clean and free from bubbles or scratches.

878. **Plates to Use for Making the Transparency.**—Special transparency plates are the best, but any ordinary slow plate will do. Rapid plates may be used, but they give less latitude in the exposure. Therefore, slow plates are recommended.

879. **Exposure for Transparency.**—The necessary exposure will depend upon the speed of the plate, the strength of the light, and also the density of the negative. The exposure should be made by artificial light. A kerosene lamp, gas, or electric light, even a lighted match, are better than daylight. In fact it is almost impossible to make the exposure quick enough by even subdued daylight.

880. **Using Ordinary Rapid Dry Plates.**—Hold the frame, containing the negative, about three feet from the light. If a 16-candle power electric bulb is used, a quick turning on and off of the light will give sufficient exposure. Two seconds exposure with a lighted match should be

sufficient for an ordinary negative. The exact time can be determined after one or two trials. The better the transparency, of course, the better will be the large negative. Avoid over-exposure which causes fog. There is less danger of a fog with slow plates than with the regular plates, although when slow plates are not obtainable ordinary fast plates may be used, but more care must be given to the exposure. It is advisable, when rapid plates are employed, to hold the negative farther from the light, to avoid over-timing. The printing-frame should never be held less than three feet from the light, except when the exposure is made with a lighted match, in which case two feet from the light will be sufficient.

881. **Developing the Transparency.**—When making transparencies from flat negatives, the contrasts can be increased by aiming at correct exposure (never *over-expose*) and developing strong. On the other hand, if the original negative is hard, give full time and develop normally to produce softness. Both the transparency and the enlarged plate may be developed in the ordinary way, using the regular *Universal Developing Formula* given in Chapter XII, but the transparency must be made stronger than for lantern-slide work, or regular direct exposures. Ordinary transparencies used for lantern projection, etc., must, of necessity, be very thin and full, with clear transparent shadows. Such a plate, if a negative were reproduced from it, would give flat, washy results, with no detail in the shadows. Therefore, when making transparencies for enlarging purposes, expose slightly longer than for lantern-slides, and develop to a good strength, using a little Bromide if you find that snap and contrast is needed. Unless the transparency has good strength the reproduction will be very flat and weak.

CHAPTER XXXVII.

Negative Enlarging With Large Camera.

882. When the large camera is used for negative enlarging, it is best to make a contact transparency from the small negative, and then enlarge the transparency. Any size enlarged negative may then be made, limited only by the size of the camera.

883. Having made the transparency, using for example, a 5 x 7 plate, you will next provide an 8 x 10 sheet of ground-glass, or, if you have no ground-glass, flow a sheet of plain glass with *ground-glass substitute*. When it becomes set and dry, which requires only a few minutes, place the glass in an 8 x 10 printing-frame, fastening it with one tack at each end. In case neither ground-glass nor substitute can be obtained, a very fine quality of tissue paper will answer, pasted over the outside of the printing frame. Place the transparency in a 5 x 7 frame, film side out, holding the transparency in the frame with thumb-tacks.

884. Having secured the negative in the printing-frame, place this small frame inside of the 8 x 10 frame, with the film side out. This will give a space equal to the thickness of the frame between the transparency and the ground-glass (or tissue paper), which is necessary, as with this space, between the two, the ground-glass is thrown out of focus when the transparency is sharp. The ground-glass, or tissue, serves as a diffusing screen and equalizes the light on the transparency. To place the negative too close to the ground-glass, would bring it in focus with the transparency, and give a coarse grain to the enlargement. This is avoided by the thickness of the printing-frame providing a sufficient distance between the two to overcome this grain.

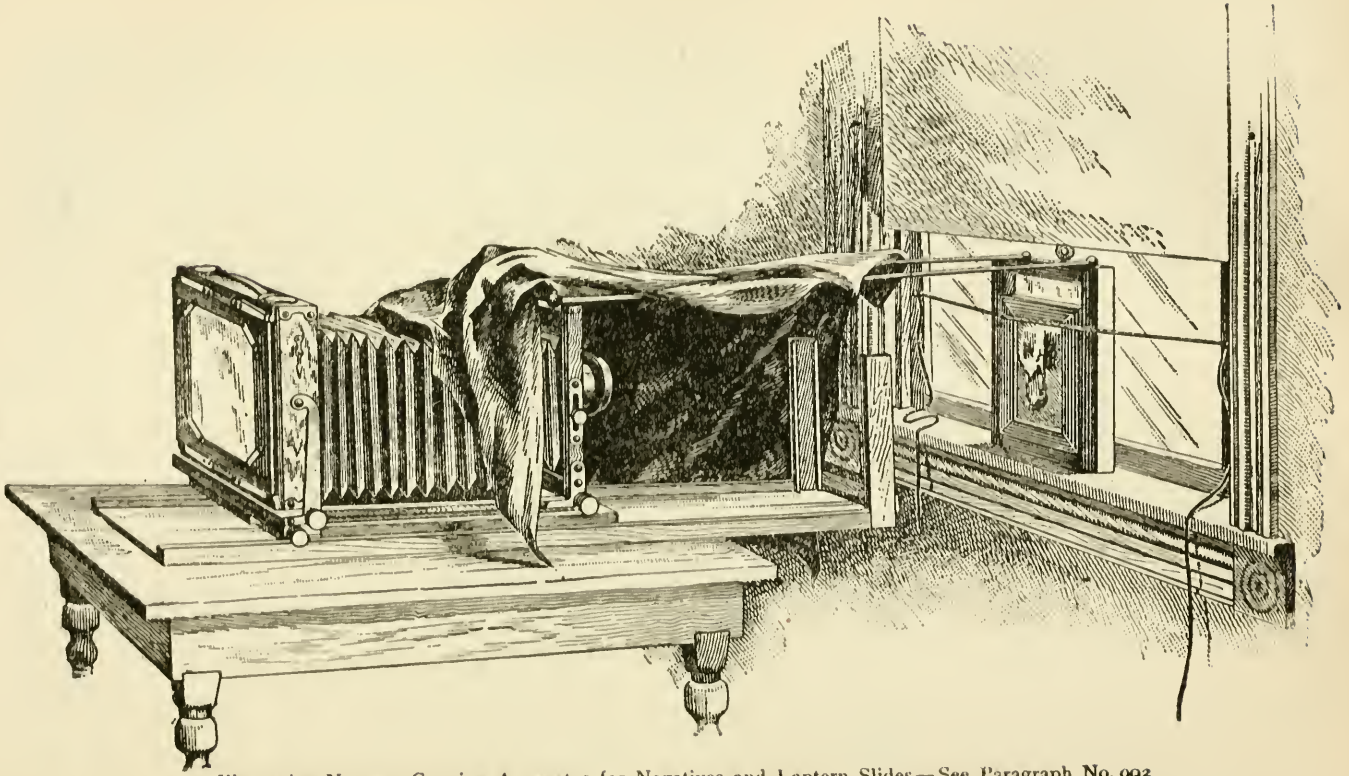


Illustration No. 24—Copying Apparatus for Negatives and Lantern Slides—See Paragraph No. 902

885. Having prepared your two printing-frames, place them in a window with an unobstructed light—a north window preferred. Let the edge of the 8 x 10 frame rest on the window sash, and hold the frames close to the window glass by means of a strong cord stretched across the window, on a line with the upper edge of the smaller printing-frame. The transparency is then ready for enlarging. For negative enlargements not exceeding 8 x 10 inches the Lantern-slide copying board may be used. (See Illustration No. 24.)

886. **Lens to Use in Enlarging.**—Any lens, other than a single lens, will do. It is preferable not to use a lens larger than the one employed in making the negative; if a larger size is used you will require longer bellows. A smaller size than that employed in making the original negative cannot be used, as it will not cover the plate sharp to the edge; but with a lens the same size, you can enlarge to any size you desire.

887. **Arranging the Camera.**—Place the large camera on a table (unless you have a stand for it) and on a level with the transparency to be copied. See that the transparency is perfectly perpendicular, and the camera on an exact line, and level with it. The size of the picture depends upon the distance the lens is from the transparency, also on the distance between the rear of the lens and the ground-glass.

888. **Obtaining the Focus.**—Place the camera, with the front of the lens within two feet of the transparency, and rack out the bellows until a sharp focus of the image on the ground-glass is secured. If the image is not large enough, push the camera closer to the transparency, and rack out the bellows further, until the correct size registers on the ground-glass. When this is obtained all light between the lens and negative from every side must be excluded. First draw the shades of the window down to the transparency; then extend two wooden strips from the camera to the top of the 8 x 10 printing-frame, and cover this frame with the focusing, or any other black cloth. This will ex-

clude the light sufficiently for the purpose intended, and the principal light will come through the transparency, thus supplying the necessary illumination for the successful copying of the transparency. (See Illustration No. 24.)

889. **Stops to Use.**—It is always advisable in negative enlarging, to use a stop at least one size smaller than is required to give a good, sharp focus. The stopping accentuates the contrast and gives a more snappy negative. When a transparency is a little flat, having been made from a negative that was a trifle flat, the result can be very much improved by stopping down, thereby accentuating the contrast.

890. On the other hand, with a contrasty transparency, where it is not desired to increase the contrast, use a larger stop. Always focus first without a stop and get as sharp a focus as possible, and then, use what ever stop is necessary to give you the desired result, judging entirely by the appearance of the image upon the ground-glass.

CHAPTER XXXVIII.

Negative Enlarging With a Bromide Enlarging Apparatus.

891. **Preparing the Apparatus for Daylight Work.**—The drawing of the daylight Bromide Enlarging Apparatus, reproduced herein, serves to illustrate the use of a hand or view camera for negative enlarging. The camera is arranged before the window in exactly the same manner as for Bromide enlarging, only you must be more particular about having the room perfectly dark. This is important, as the dry plate which is to be used is about twenty times more sensitive than the Bromide paper, and if the room is not perfectly light-tight there is danger of fogging the plate.

892. **The Easel.**—For the easel, you may use an ordinary box, or construct a regular easel as shown in Illustration No. 6. In either case instead of covering the easel with white cardboard, cover it with a dark cardboard, or dark paper, as the dry plate is so very sensitive, that the white cardboard will cause halation, and probably fog.

893. **Focusing.**—Place the transparency in the camera, in exactly the same manner followed for Bromide enlarging, with the film side facing the lens. Place the easel directly in front of the camera and within two feet of it. Rack out the bellows, or move the easel backward or forward, until the desired enlargement is obtained. The size is controlled by the distance between the lens and the easel. In obtaining the focus, attach to the easel a white card of the same size and thickness as the plate to be exposed. This will give a perfect focus. To attach this card use thumbtacks, as they have larger heads, and will hold the card more firmly.

894. Place a tack about one inch from each corner of the bottom of outline of the negative on the screen, indicating where the card should be placed. These tacks serve as a support, and hold the card firmly, and also indicate where the sensitized plate must be placed. After obtaining the focus, attach the plate to the screen. First, however, cap the lens, or close the shutter, and exclude all light from the room. Remove the cardboard, take the plate to be exposed and place the lower edge upon the thumb-tacks, adjusting it to the same position occupied by the cardboard. Place another thumb-tack at the top, at the center of the plate, to hold it securely for the exposure.

895. When a little light for the arranging of the plate is desired, use a ruby-lamp within a few feet of the easel. This is not often necessary as the plate can usually be arranged without a light of any kind.

896. **Exposure.**—The exposure depends on the quality of the transparency, and the strength of the light employed. A medium strength negative may require four seconds exposure, or it may require eight seconds, all depending upon the nature of the illuminant. A hard or contrasty negative will require double the exposure of a soft snappy one, and where artificial light is employed, four times the exposure necessary for daylight will be required.

897. The exact time can only be ascertained by experience. It is best for the first experiments to use a plate of small size. Place it in the center of the enlarged image; with a cardboard, cover one-half of this plate and give four seconds exposure; then remove the cardboard and give the entire plate four seconds more exposure. One-half the plate will have been exposed four seconds and the other half eight seconds. Develop this plate, and the result should indicate the necessary exposure. If the half given four seconds exposure is fully-timed, the portion given eight seconds exposure will be fogged and flat. If, on the other hand, the portion given four seconds exposure is found lacking, and not strong, this will indicate that it was insufficient. Should the portion given eight seconds be full of detail

STUDY

STUDY No. 16—See Page 392

ALFRED HOLDEN

and of good strength, it will show that eight seconds is nearly the correct exposure. In a word, the result of this experiment will determine the proper exposure required for the transparency being used.

898. **Developing.**—The enlarged negative, as well as the transparency, can be developed in *normal* developer, with a little Bromide added. The Bromide will hold the shadows clear, and prevent fog, thus giving more snap and vigor to the negative. Without Bromide, even with the correct exposure, the negative is apt to be flat and weak. The latitude in enlarged negatives, especially where fast plates are used, is not so great as when photographing direct, because the contrasts between the high-lights and shadows are not so pronounced, as they all appear on a flat surface.

899. Negatives which vary in exposure, whether over or under-exposed, especially over-exposed, may be controlled in the developing if treated according to the exposure. (See "Developing Over-exposures and Under-exposures." Enlarged negatives should always be developed a little stronger than smaller negatives. The *Universal Pyro Developer,* formula for which is given in Chapter XII, should be used, as the Pyro gives more color, thus producing better printing quality in the negative. This is essential, especially for large negatives.

900. **Artificial Light.**—The same method followed in Bromide enlarging by artificial light may be used for negative enlarging, but more care must be exercised about the darkness of the room, as the dry plate is twenty times more sensitive than Bromide paper, and the least trace of actinic light will fog the plate. The placing of the transparency in the camera, the focusing and exposing, are exactly the same as for Bromide enlarging, with the exception that the dry plate does not require as long an exposure as Bromide paper; but the exposure for negatives enlarged by artificial light, should be four times as much as for daylight.

901. **Making an Enlarged Transparency.**—With either of the methods employed for making the enlarged negative, an enlarged transparency can be made, and from this transparency, the large negative is made by contact printing. Where the small transparency was previously used for enlarging, you now use the original negative, and make the enlarged transparency in exactly the same manner as the enlarged negative. In exposing for the large transparency, give the same time as for the enlarged negative, and in developing, carry it a trifle farther than for ordinary negatives, thus allowing for the reproduction onto another large plate, thereby producing a new negative.

902. **Making the Negative by Contact from the Large Transparency.**—To make the enlarged negative from this enlarged transparency, place the transparency in a printing-frame having good, stiff springs. Place the unexposed plate on top of this transparency, film to film. Cover the sensitive plate with a sheet of black paper and then clamp firmly. Be careful to dust both transparency and plate free of specks; also be sure that the back (the glass side) of the transparency has been thoroughly cleaned, as the least marking, or particle of dust or dirt, will show in the enlarged negative. It is advisable, in order to produce perfect contact, to use a soft pad between the unexposed plate and the back of the printing-frame. Unless the negative and transparency are in perfect contact, that part not in contact will be out of focus and appear blurred.

903. **Making the Exposure.**—The exposure should be made by artificial light, and as the large size plate will require double the exposure of the small one, you must time accordingly.

904. This last method of negative enlarging, as previously stated, requires two large plates, and while it is a trifle more expensive, yet, for the very finest results it is the best, less grain being produced in this way than if the transparency were made from the original negative by contact and then enlarged from this small transparency.

905. **Making Transparencies on Film.**—Films may be

employed for making a small transparency, either from a film or glass negative, and the film may then be enlarged on a glass plate, the same as though a glass transparency were used.

906. **Making Small Size Negatives from Large Ones.**—For this work only the regular camera with the regular lens fitted to it will be required, providing it will make a picture as large as the size desired to reduce to. In this case, when reducing, a lens as large as that used in making the original is not needed, but only one large enough to make the size picture required. For example, to reduce an 8 x 10 negative to 5 x 7, any lens that will cover a 5 x 7 plate may be used.

907. **Copying the Negative.**—In making a reduced negative from one of larger size, instead of making a contact transparency, copy the negative, thus making a small transparency of the size desired. From this small transparency make a small negative by contact, and develop in the ordinary way.

CHAPTER XXXIX.

Difficulties—Negative Enlarging.

908. **Securing Proper Illumination on Negative or Transparency to be Enlarged.**—Follow closely the instructions given in regard to using a *reflector* for daylight. Adjust this properly and this difficulty will be readily overcome.

909. **Judging Proper Illumination when Enlarging from Negative or Transparency by Artificial Light.**—Be careful to place the artificial light far enough away from the ground-glass to illuminate it evenly *all over*. If a reflector or a white lined box is used, and care is taken to have the light far enough away from the ground-glass, an even illumination will be produced. If either condensers, the Folmer and Schwing enlarging apparatus, or the home-made enlarging camera are used, then by means of the number of ground-glasses employed you have absolute control over the illumination and will experience no trouble.

910. **Obtaining a Sharp Transparency.**—When making a small transparency it is absolutely necessary that the plate be in perfect contact with the negative. By using a printing-frame, with good stiff springs giving plenty of pressure, this is very easily accomplished. Usually this difficulty presents itself more frequently where transparencies are made from film negatives, yet the film can be brought into absolute contact by backing, and having sufficiently strong springs in the back of your printing-frame. If these springs are rather weak, bend them back a trifle and they will give better pressure.

911. **Obtaining Sharp Enlarged Transparency.**—This can be accomplished if great care is exercised about focusing, and by using a small enough stop.

912. **Overcoming Distortion.**—Be careful to place the camera and negative or transparency in an absolutely perpendicular position—the negative or transparency parallel with the camera—the distortion will then be overcome.

913. **Producing a Sharp Image when Enlarging from a Small Transparency.**—Focus carefully with the lens wide open. Get the image just as sharp as possible on the ground-glass, and use a stop sufficiently small to sharpen the entire image.

914. **Proper Exposure.**—This, like making regular exposures,

requires practice, and it is necessary that the results be closely observed. Keep a memorandum of the conditions of light, strength of negative, and also exposures given. If, upon developing the negatives, they prove to be under or over-exposed, estimate accordingly the next time an exposure is made, whether it be a transparency by contact or a transparency by enlargement.

915. **Transparency Plate too Dense.**—This is either caused by over-exposure and over-development, or even by proper exposure and over-development. With a little practice this difficulty will be readily overcome. Should the plate be too dense reduce it with Red Prussiate Reducer, (See Chapter X).

Transparency Plate too Contrasty.—This is generally caused by under-exposure, but proper exposure and the using of too much restrainer (Bromide solution) will also cause it.

916. **Negative from Transparency Flat.**—If the transparency is a weak, thin one, the enlarged negative will also be weak, thin and flat. If over-exposed, whether in making the enlargement from a large transparency, or enlarging from a small transparency, and the proper method in developing for over-exposure is not observed, the result will be flat negatives. When developing negatives from thin, flat transparencies use a strong restrained developer; this will assist in giving contrast.

917. **Enlarged Negative from Transparency Showing No Detail in the Shadows.**—If the transparency has no detail, which would be the case in an exceedingly contrasty or under-exposed transparency, there would be little or no detail in the enlarged negative. Under-exposure in the enlarged negative would also cause a lack of detail.

918. **High-lights in Both Transparency and Enlarged Negative Hazy and Flat.**—A certain sign that both the transparency and enlarged negative are over-exposed; or if the transparency is brilliant, has clear shadows, and only the enlarged negative has high-lights that are flat and hazy, this would indicate that the enlarged negative was over-exposed. By using slow plates for making the transparencies the flatness will be overcome as there is much more latitude to the exposure.

919. **Shadows not Transparent Enough.**—This effect is produced both in the transparency and enlarged negative by over-exposure. If, however, the transparencies are over-exposed or over-printed, the enlarged negative is sure to have shadows that are not transparent, even though the enlarged negative be properly exposed.

920 **Enlarged Negative too Gray in Color.**—To overcome this difficulty, simply weaken the Sulphite of Soda solution, as the Sulphite of Soda controls the color.

921. **When Using Artificial Light Other than Arc-light the Entire Ground-glass not Evenly Illuminated.**—By using opal glass in place of ground-glass and placing the light far enough away from the glass, this difficulty can be overcome almost entirely. It is harder, however, to evenly illuminate the negative by artificial light than it is by daylight. A good reflector is necessary; therefore, line the entire box that holds the light with asbestos or tin. The white box will then act as a reflector and more evenly illuminate the ground or opal glass.

922. **Proper Exposure for Transparencies.**—When printing the transparency, whether by contact or by enlarging, a number of experiments will be found advisable. Be guided by the results thus obtained and govern the exposure for all future results accordingly.

923. **Pin-Holes in Enlarged Negative, Which are Hardly Visible in the Transparency.**—These pin-holes are caused by dust on the negative or transparency plate when making the transparency. When the enlarged negative is made these pin-holes are also enlarged, and will show very much exaggerated in the enlarged negative. Carefully dust the plates, negative, and printing-frame, also the inside of the camera, and this defect will be prevented.

924. **Streaks and Marks on the Enlarged Negative.**—These are generally caused by dirt on the back or front of the negative or transparency. Be sure that both the front and back of the negative are perfectly clean.

925. **Spots Transparent and Semi-Transparent that are not Caused by Dust.**—These are generally caused by particles of dirt in the developer, or air-bells gathering on the plate when first placed in the developer. A good plan is to keep a piece of absorbent cotton thoroughly saturated with developer in the developing tray, and to swab the entire surface of the plate with the absorbent cotton. This will remove all tiny air-bells and dirt.

926. **Center of Large Negative Seems to Have More Exposure Than the Edges.**—This is because the light is not evenly distributed on the ground-glass and negative, and will occur more often when using artificial light. To overcome this it will be necessary to place the light further away from the ground-glass.

927. **Enlarged Negative Very Thin and Full of Detail in the Shadows.**—This is a certain sign that the plate was over-exposed, that it was not treated according to exposure while developing, and was not developed far enough. It is always advisable to overdevelop an over-exposure, and then reduce, according to the instructions given in lesson on Reducing.

928. **Transparency Very Thin, Shadows Filled with Detail.**—The remedy for the preceding difficulty also covers this one.

929. **Enlarged Negative Very Grainy.**—If the ground-glass or tissue paper is too near the transparency you are enlarging, or the negative from which the enlarged transparency is being made, the grain of the ground-glass or texture of the paper will show in focusing, and this will, of course, show in the enlarged negative. Transparencies which are under-exposed and then forced in development will also have considerable more grain than when they are properly exposed, and this grain will show stronger in the enlarged negative; therefore, aim for correct exposure for your transparency.

930. **Black Comet-Like Specks in the Enlarged Negative and also in the Large and Small Transparency.**—This is generally caused by iron rust in the water or undissolved particles of Pyro. If these settle on the plate when it is first placed in the developer, they are apt to cause these spots. Filter the developer.

931. **White Spots, Irregular in Shape, in the Enlarged Negative.**—Caused by iron rust in the developer or wash waters. These spots will appear opaque on the transparency, and prevent the light from passing through them, thus producing light spots, which will result in black spots on the finished print.

932. **Light Transparent Spots on the Transparency.**—These are caused by small air-bells gathering on the plate when developing, and which, when enlarged, will produce black spots on the enlarged negative, resulting in white spots on the finished print. Carefully dust the negative and transparency and also filter the developer.

933. **Enlarged Negative too Strong in Color—Yellow.**—Strengthen the Sulphite of Soda and this will be readily overcome. Also bear in mind that Sulphite of Soda, even though it tests full strength, if it has been made up for some time and is an old solution, will not have the same chemical value as a fresh solution, and should be discarded and a fresh solution be made up.

934. **Negatives that have been Properly Exposed when Enlarging from a Small Transparency, or a Transparency that has been Properly Exposed when Enlarging from a Small Negative, Appearing Hazy or Fogged.**—This would result if the light were allowed to enter between the lens and the negative, or transparency. A hood or cloth must be used over the space between the lens and negative or transparency being enlarged from.

935. **Kerosene Light Flickers.**—This is a certain sign that the box is not properly ventilated. It must be ventilated from the bottom and also from the top in order to have the lamp burn steady. This will also apply to gaslight.

CHAPTER XL.

Negative Retouching.

Introduction.

936. **The Object of Negative Retouching.**—In delivering finished work to your customers, you do not hand them the photographic negatives, but the prints made from these negatives.

937. In the early days of photography, when the so-called "wet-plate process" was in use, prints were made direct from the negative without any alteration whatever, as the wet-plate rendered softer effects than are obtainable with the ready prepared dry-plate. The imperfections were less visible, and at that time the general public were satisfied with an exact likeness of themselves. With the advent of the dry-plate, however, the defects in the human face became more apparent on the negative, and there arose a demand for a greater softening of the lines and a removal of the more objectionable imperfections. At first, these imperfections or blemishes were removed, by means of a brush and color, from each individual print. So numerous, however, were these imperfections, and so irksome became the labor of eliminating them from the print, that the photographer was compelled to devise some means whereby he could apply these remedies direct to his negative so that each print made from the negative would have these blemishes eliminated. The results of these endeavors led to retouching the negative.

938. From the above we see that the object of negative retouching is to remove all the imperfections from the negatives, placing them in such a condition for printing that the

resulting prints will all be uniform, and no extra work will be required upon them after they are finished and mounted.

939. When photographers first began retouching it was done with brush and India ink, but they finally adopted the use of metallic lead, first grinding the surface of the film of the negative with pumice stone, in order to produce a "tooth," and then, by means of metallic lead, penciling over the objectionable portions. Later on, when the prepared papers came into use, it was found that the ground surface of the film was objectionable, as the grain reproduced in the print. After considerable experimenting a solution was adopted and applied to the negative, giving sufficient "tooth" to enable the use of an ordinary lead pencil for removing the blemishes. This solution is known today as retouching varnish, or "dope."

940. Probably one of the first solutions of the kind placed upon the market was Jewell's Retouching Medium, and today there are many mediums prepared after similar formula, all of which are good for the purpose.

941. **Negative Retouching.**—The photographic negative, whether portrait or landscape, is seldom ready for printing immediately after it is dry. A certain amount of hand-work on it is necessary, and the process of correcting existing defects and building onto, or taking from, various parts is termed retouching and etching, respectively.

942. By retouching is meant the removal of all spots, blemishes and imperfections in the negative, as well as the *building* up of shadows, hollows, etc., that are visible; also the modeling of the features in a portrait, and the accentuating and strengthening of details in landscapes, architectural and commercial negatives. To accomplish this, we must apply some substance that will blend perfectly with the color of the plate. Some plates being more dense than others require a heavier or lighter application of this material. The negative being of a slate-brown color, the nearest approach to matching this tone is with the lead color; therefore, a lead pencil is employed for retouching.

It is not only very convenient to handle, but also very easily applied.

943. **Etching.**—Etching is exactly the reverse of retouching, for by means of the etching knife, which is a very sharp steel blade, the film is shaved or scraped in proportion to the amount required to be removed; thus high-lights are reduced, shadows accentuated, objectionable portions removed, and detail produced where the opacity of the negative was so strong as to destroy it.

944. **Object of Retouching.**—We have seen that the object of retouching and etching is to remove spots, blemishes and imperfections, and to model the portrait negative or perfect the landscape negative. The lens often sees more than the human eye. It may magnify imperfections which are unobserved on the natural object or subject. The ordinary plate does not reproduce the tonal values of the object, yet it is used for most all purposes, with the result that light blues reproduce white, yellow reproduces very dark, ruddy cheeks appear hollow, etc.

945. Many times the operator fails to correctly light the subject, and the false lights which will then exist must be removed and correct lights built up. The negative may be under or over-exposed, under or over-developed. There are times, also, when it is necessary to alter the expression—to remove a scowl, or to close an open mouth with teeth showing. The drapery may have to be changed and imperfections removed which the operator has failed to overcome. It is for these and many more reasons that retouching is necessary. The photographer, in making the negative, should aim to reproduce in the portrait the very best qualities of the individual, subduing the more undesirable features. If he has failed in this, his retoucher must do what he can to correct the oversight or deficiency.

946. Although few workers agree as to the exact amount of retouching required, all acknowledge that a certain amount is absolutely essential in order that the negative may be in perfect condition for printing. A certain class of workers contend that there should be little

more than enough lead applied to the plate to remove the most apparent predominating blotches and spots. Then, there are those who go to the other extreme and literally cover the negative solid with lead, retouching without any regard whatsoever for the modeling, or without even attempting to retain the likeness of the individual. It is their aim to idealize the subject. While this is permissible and can be accomplished by the judicious application of the lead and etcher, yet by over-retouching all character and expression of the face is lost. Judgment must, therefore, be exercised just as much in retouching as in any of the other branches of photography and a mean between these two extremes aimed at.

947. It is not only necessary to remove the transparent and more striking imperfections, but the entire face should be blended and modeled so that no harsh lines exist. Aim to secure a thin negative which will produce a print with excellent gradations between high-lights and shadows; a print that will retain all of the character and likeness of the individual. The general public demands considerable work on the portrait negative, but the retoucher must use careful judgment and not go so far with the pencil work as to destroy all likeness and flatten out and destroy the modeling.

948. **Classified Subjects.**—The subject has everything to do with the amount of work applied to the negative. For example, negatives of aged persons, whether man or woman, require less lines to be removed than younger people, and negatives of men require less retouching than those of women, regardless of age. Children with plump, solid faces usually have few imperfections to correct, yet their little faces should be modeled and rounded. Thus, it will be seen that judgment must be exercised in the application of the work, being guided entirely by the subject you are working on. It is true that in some instances customers require all lines removed regardless of their characteristic bearing. In many cases these same customers will be well pleased if their lines are modified, yet

retained to a certain degree. Wherever possible, one should strive to retain as much of the characteristics of the subject as possible.

949. **Learning Retouching.**—It is by no means a difficult matter to learn the art of retouching, for all who will study and apply the fundamental principles should be able to improve their negatives. Perfection in negative retouching, however, will come only by continual practice. The reason beginners fail at times to secure satisfactory results in their first attempts, is due to the fact that they become anxious to see their final results too quickly and thus apply too much lead in an unsystematic manner and in places where it is not needed. It is only by a slow and intelligent manner of procedure that you will master each and every principle. It is absolutely essential to understand the elementary principles of the work before you can expect to produce the best of results and gain speed in operation, which latter comes only by practice.

CHAPTER XLI.

Negative Retouching.

Preparatory Instruction.

950. The pencil is the agent employed, in retouching, to remove transparent or semi-transparent imperfections and blend the high-lights and shadows as well as the half-tones. The pencil employed must not be gritty, nor should it be soft or mushy. For the beginner, it is advisable to use a reasonably hard lead, such as a Faber's HHH or any drawing pencil of equal hardness. After some experience, and when you begin to master the touch required and are able to control the application of the lead, it will be advisable to change to an HH lead. This latter will be found very suitable for the majority of workers.

951. **The Materials Required.**—The absolutely necessary articles required for retouching are few, but no work should be attempted without them. The following outfit will be required to prepare the work of this instruction:

952. **Retouching Outfit.**—

1 Retouching Easel.
1 Magnifying Glass.
1 Lead Holder.
1 HHH lead.
1 HH lead.
1 BB lead.
1 Etching Knife.
1 No. 1 Faber's Spotting Brush.
1 Cake Spotting Opaque.
1 Bottle Retouching Fluid.
1 Bottle Negative Varnish.
1 Box Schriever Etching Paste.
1 5 x 7 Printing Frame.

1 Package Proof Paper.
12 Practice Plates of Bust Portrait Negatives.

953. **Object of Retouching Desk.**—The retouching desk or frame is necessary for holding the negative so that it may be held conveniently and permit of strong light being reflected through it, thereby exposing the imperfections and making it possible to see and easily remove them. The negative must be properly supported in this frame so as not to require holding in position. Both hands can then be free, thus enabling you to view the work you are doing from any point, thereby concentrating your attention upon the removal of the imperfections and modeling to the desired degree.

954. **Preparing the Negative.**—With the easel provided, the next step is the preparing of the negative. The surface of the film of the negative (the side which is to be worked upon) is usually so very hard and smooth that the pencil touches will not adhere. For this reason it is necessary that the negative be properly prepared to receive the pencil strokes.

955. **Retouching Medium.**—There are two kinds of retouching medium, either of which can be purchased from any photographic supply dealer, or you can prepare it yourself. One medium is called *retouching dope* while the other is *retouching varnish.* The former is quite thick and gummy and is applied to the negative by means of a tuft of cotton, or a Canton flannel cloth. The entire negative is not prepared; only the space covering those portions you wish to retouch is doped. After applying, the dope must then be rubbed in a circular motion until nearly dry.

956. The retouching varnish is very thin and is, therefore, applied by flowing the entire plate. Do not confuse these two mediums.

957. To prepare retouching dope yourself, proceed according to the following formula:

Retouching Dope.

Balsam of Fir ..... 1 oz.
Turpentine ..... 1 oz.

958. This is a very simple preparation and supplies a most excellent retouching medium and for the beginner gives the best of satisfaction. If, after applying the medium to the negative, it does not take the lead freely, add from ⅛ to ½ oz. of ordinary resin to the medium—the amount of resin depending upon the amount of tooth you desire. Be sure to keep the bottle, in which the dope is prepared, well stoppered, for the turpentine easily evaporates, leaving a thick mass in the bottle, which, if applied to the negative, in this condition, will give you a very tacky surface to work upon and will not produce smooth results.

959. Another retouching dope which works satisfactorily, is prepared by mixing:

Turpentine	1 oz.
Oil of Lavender	15 drops
Gum Dammar	½ drm.

960. **Applying the Retouching Dope to the Negative.**—The plate must be perfectly dry before applying any medium. In applying the dope to the negative the smallest quantity must be used, for if too much is employed it it will require a longer time for it to dry and the over-charge of dope may show in the print. A drop or two applied to the space you want to retouch, or just enough to give a tooth, is all that is necessary.

961. A simple way to apply the dope would be to prepare your medium in a two ounce, wide mouthed bottle, having a cork stopper. In the under side of the cork insert a wooden toothpick. By placing the cork stopper into the bottle, the toothpick is always immersed in the dope, and when you want to prepare a negative all that is required is to withdraw the stopper and touch the point of the toothpick to the surface of the film. Each touch will leave a drop of the dope, and from 1 to 3 drops is sufficient for a space 3 inches in diameter.

962. After dropping on the dope, return the cork to the bottle and spread the solution with a small tuft of absorbent cotton (or Canton flannel cloth), lightly rubbing the parts to be retouched in a circular motion until the

dope begins to feel tacky, at which time rub a little harder until the surface becomes smooth. Should the dope evaporate at any time and become so thick and sticky that it is difficult to use and spread on the negative, the addition of pure turpentine will bring it back to its normal condition. As the fluid dries quickly when applied to the negative, you may have to try several times in order to secure the desired result. In case it does dry before you get it rubbed, slowly add a little more fluid and repeat the operation.

963. The surface, when properly prepared, must not appear sticky nor tacky, but slightly glossy. If it is tacky, or, in other words, too thick, too much of the fluid has been left on the plate and the lead will take too readily. If too little of the fluid is left on the plate, you will not have sufficient tooth and the pencil will hardly make a mark. After a little practice you will be able to prepare the plate properly.

964. **Retouching Varnish.**—Where the retouching varnish is employed in place of the dope, Hammer's Retouching Varnish will be found by far the most satisfactory medium to employ. The following formula is an excellent one for preparing a similar varnish:

Gum Mastic .....23 grs.
Ether .....1 oz.

The ether cuts the gum and the latter must be thoroughly dissolved.

965. A mortar and pestle will be very serviceable in preparing this medium. After the gum is thoroughly dissolved it is poured very slowly (drop by drop) into 6 ounces of gasoline. *Do not* stir the gasoline while adding the gum, but allow the gum solution to mix with the gasoline itself. By adding the gum slowly drop by drop, the gasoline will take care of the gum and properly dissolve it. After the gum solution is added, set in a cool place, undisturbed for at least 12 hours before using. Under no circumstances should this preparation be removed or disturbed until sufficiently seasoned, ready for use.

966. **Varnish Caution.**—As gasoline will very easily ig-

nite, it must never be handled near fire or lights of any kind.

967. **Applying the Varnish to the Negative.**—The varnish is applied by holding the negative perfectly level in one hand. With the plate resting on the tips of three fingers and between the ends of the little finger and thumb, pour a sufficient quantity of the varnish on the upper right-hand corner, so that when the negative is slightly tilted the varnish will flow evenly over all portions. By tilting the plate first slightly to the left, you will cover the upper portion evenly; then slightly raise the upper end, so the varnish will descend and flow evenly towards the bottom of the plate. In this way you will obtain an uniform flow of the varnish and produce an even surface. Never tilt the plate back after the varnish has been flowing in one direction—to do so will give you ripples and lines in the varnish. The surplus varnish flowing from the plate may be drained back into the bottle. A large-mouthed bottle should be used for the retouching dope and a small-mouthed bottle for the retouching varnish. Keep both tightly corked.

968. **Removing the Retouching.**—When it is desired to remove the retouching, which is frequently the case—especially with your first experiments where too much lead is applied to produce the desired results, or where the dope applied does not give sufficient tooth, or where, for any reason, you want to work the plate over again and the work applied is to be removed—do so by applying the solvent of any medium you are using. If you are using retouching dope, then drop a few drops of turpentine on the negative and with a tuft of cotton rub over the surface, which will instantly remove all retouching, as well as the dope.

969. The *retouching dope* may be substituted for the *turpentine* to erase work done, if so desired. When using the dope for erasing the lead, you also prepare the plate again for retouching. When the turpentine is used for erasing the work done, the surface must be rubbed perfectly dry before again applying the dope.

970. When *retouching varnish* is used as the retouching medium, the solvent employed in making the varnish may be used for removing the varnish and retouching from the negative. The solvent used in the formula given herein

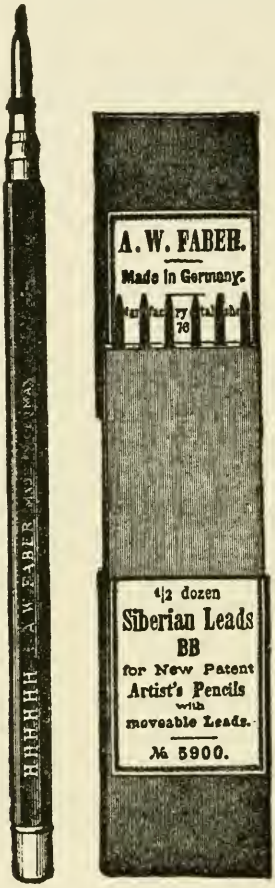


Illustration No. 25
Faber Pencil Holder and Leads
See Paragraph 971

for retouching varnish, being gasoline, pure gasoline should be used when it is desired to remove any work where this medium is employed. Where gasoline cannot be had, wood

alcohol may be employed successfully by applying a few drops to the plate and rubbing dry with a tuft of cotton.

971. **Pencils.**—The principal pencils in use are those made by the A. W. Faber Co., and while pencils suitable for retouching are made protected by cedar wood, similar to the ordinary pencil, yet the loose leads made for the adjustable holders are employed almost exclusively for retouching, as the latter are by far more economical and convenient to use. (See Illustration No. 25). One holder will be all that is necessary, no matter how many different leads you desire to use. The leads are made in various degrees of hardness, costing 50 cents for a box of six leads.

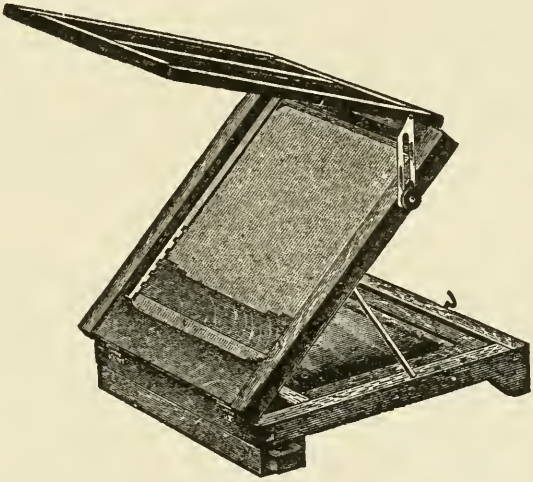


Illustration No. 26
Retouching Desk
See Paragraph 973

972. The most useful leads, as previously stated, are the HH and HHH. Once in a great while it will be desirable to use a BB lead, which is quite soft, and will be serviceable when building up very transparent shadows, or removing extremely heavy imperfections, spotting negatives, etc. The pencil should be sharpened at a far more tapering point than is generally used in the average writing. The point of the lead should be at least ½ inch from the

commencement of the taper, and should be smooth and even.

973. **Retouching Desk.**—A suitable retouching desk may be obtained from regular dealers in photographic supplies. In Illustration No. 26 is shown a very convenient easel which will close up in very compact form. For those who prefer making their own outfit, the following description may be of assistance:

974. A retouching desk or easel should be made as convenient and yet as compact as possible. First, provide three pieces of soft wood surfaced on both sides, ½ inch thick, 18 inches long and 14 inches wide. Cut an opening in the center of one of the boards, the opening measuring about 4 x 6 inches. Next provide two pairs of small hinges. Attach one pair under one end of the board with the hole in the center, and to this end attach the board to be used as the baseboard. At the other end or top of the easel, and on the upper side, attach the remaining pair of hinges and fasten the headboard to this end. With these three boards attached they will fold together nicely.

975. The easel may be set up so the center board will stand at an angle of about 30 degrees with the table. This may be arranged in two ways, either by attaching stationary braces or movable ones. By the former method you nail two wooden braces (one on each side of the frame) to the lower and middle sections. You also attach a pair of braces on each side of the upper and middle sections. Braces for the lower section will need to be about 14 inches in length and should be attached to the rear edge of this section, while the ones for the upper section need not be over 8 inches in length and should be attached about 7 inches from the upper end of the top and middle sections, raising the upper section to a height suitable to your convenience.

976. As the upper section serves as a hood for shielding light from overhead, this section must be made to suit the person working under it and, therefore, the length of the brace for this will depend entirely upon the user. With

the easel arranged in this manner, it will form a letter Z. Where it is desirable to make the easel adjustable to different heights and collapsible so that it may be folded up when not in use, the braces may be made detachable as follows:

977. Insert a few holes, half-way through the wood, about ¼ inch in size and one inch apart, on both sides of the middle section, on the lower side of the top section, and on the upper side of the bottom one, locating them about 6 inches from the hinge joint on the top section and about 10 inches from the hinge joint on the bottom section. Next provide four small rods of wood or metal to insert in these notches or holes, to support the frame when in use. In order to hold the negative in position in the retouching frame, insert two thumb tacks at the base of the opening in the center board. An opaque cloth thrown over this desk will keep out all light from the film side of the negative and permit retouching with ease and without any strain on the eyes. With this arrangement the desk is complete.

978. **The Reflector.**—The retouching frame should be placed on a table of normal height, close to a north window, or a window on which the sun is not shining. In order to have the light reflect evenly upon the negative, a sheet of white paper about 15 inches long may be placed directly underneath the negative on the lower section of the frame. The regular retouching easels are supplied with a mirror for the reflecting surface, but the white cardboard answers every purpose.

Illustration No. 27
Reproduction of Negative before Retouching
See Paragraph 980

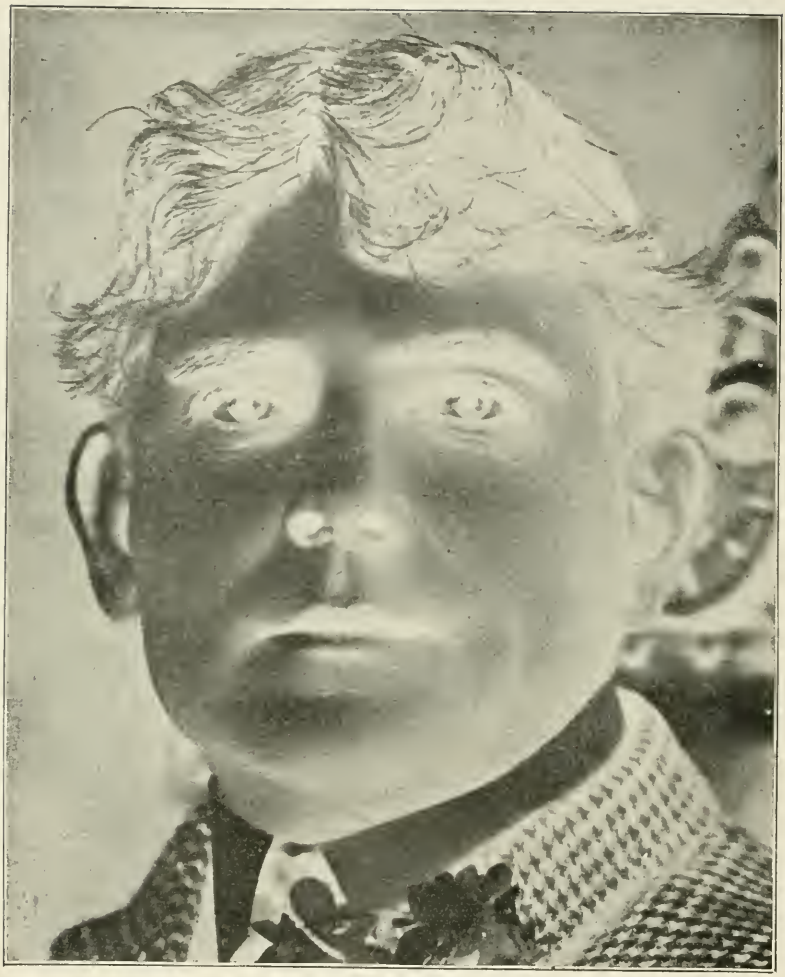


Illustration No. 28
Reproduction of Negative Retouched
See Paragraph 980

Illustration No. 29
Print from Unretouched Negative
See Paragraph 980

Illustration No. 30
Print from Retouched Negative
See Paragraph 980

CHAPTER XLII.

Negative Retouching.

General Explanations.

979. **The Negative.**—Before beginning any work upon the negative, it is of utmost importance to have a thorough understanding of the method of controlling the pencil, in order to effectively apply the proper strokes to the negative. You should also understand thoroughly what imperfections are to be removed and what effect the retouching has upon the negative. You should, further, familiarize yourself with the appearance of the negative compared with the positive.

980. Beginners usually become confused when attempting to work on the negative, forgetting that the negative is just the reverse of the positive. When speaking of highlights in the negative, we have reference to the black portions or those parts which print white on paper. In speaking of shadows in the negative, we have reference to the white portions or thin parts which print black on paper. You must try to familiarize yourself with these facts. In order to more clearly demonstrate this point carefully examine Illustrations Nos. 27, 28, 29 and 30.

981. Illustration No. 27 is the exact reproduction of the negative as it appears before retouching. All of the blemishes, blotches, freckles, etc., are very much in evidence. In Illustration No. 28 is represented the same negative with all defects eliminated. It also shows how the face has been smoothed over, with the blotches filled in and built up equal to the other portions of the negative. It shows the modeling of the face with harsh lines subdued.

982. Illustration No. 29 shows a print from the nega-

tive in Illustration No. 27, before retouching. In Illustration No. 27 you will notice the spots are white. This is as they appeared in the negative, being transparent or semi-transparent. These white spots are reversed or just the opposite in the positive, for spots, freckles, pimples, etc., are usually red and reproduce black on paper, but in the negative as shown in Illustration No. 27, they are transparent and appear white. When printing from a negative with these transparent or white spots, blemishes, etc., you will observe that they become reversed, as in Illustration No. 29. The spots that are transparent in the negative (showing white in Illustration No. 27), are reversed and print black, as in Illustration No. 29, producing a very displeasing effect.

983. Illustration No. 30 shows a print from the negative shown in Illustration No. 28, completely retouched. In Illustration No. 28, which represents the negative, the black portions appear white, while the hair, eyes, mouth and shadow side of the face, are quite gray in some portions and white in other parts. In the positive, Illustration No. 30, you will see that they are reversed and these light parts are dark. Again in Illustration No. 27, the light side of the face appears very black in the negative. In Illustration No. 29, a positive from this negative, the high-lights are white and the shadows black.

984. Between these high-lights and the most dense shadows, we have what are termed intermediate tones, or, technically speaking, half-tones—tones that are less pronounced, milder, yet visible on close observation. These tones all have their value and must be preserved in their relative position to the higher lights as well as the shadows. Carefully study the illustrations above mentioned before proceeding with the actual practice work.

985. **Sharpening the Lead.**—Insert one of the leads (preferably an HHH) in the holder, leaving about one inch projecting from the end of the holder, and screw the clasp moderately tight. Sharpen the lead to a needle point with a long slant. This is best done with an emery paper hone.

PORTRAIT STUDY

STUDY No. 17

B. J. FALK

Fig. 1

Fig 2

Fig. 3

Illustration No. 31
Holding the Pencil and Etcher
See Paragraph 988

Do not use a knife for this purpose, but prepare a hone as follows:

986. Provide a piece of wood 1½ to 2 inches wide by 6 inches long, and about one inch thick. Glue a piece of emery paper of medium smooth surface to one side of the block and on the other side a piece of moderately rough emery paper. Shape the lead with the rough paper and finish off with the smooth. To sharpen the lead properly you must hold the pencil almost level with the hone. In order to grasp the pencil properly proceed as follows:

987. Place the pencil flat on the table. Grasp it about the center, between the tips of the thumb and fingers. Hold it on the hone at an angle no greater than sufficient to avoid the metal clasp of the holder rubbing on the paper. To sharpen the pencil rub it over the hone, first on the coarse side and finally on the fine emery paper. Rub lengthwise (not crosswise), using quite a long stroke, continually rotating the pencil while sharpening. To hone the lead sideways would probably result in breaking the lead. A final finish may be put on the point by rotating it on a piece of ordinary writing paper. This will remove any surplus powder of lead which would adhere to the retouching medium immediatly upon placing the point in contact with the film.

988. **Holding the Pencil.**—In Fig. No. 1 of Illustration No. 31, is shown the first method of holding the pencil. You will observe that about two inches of the pencil is extended beyond the index finger. The pencil is resting alongside the third finger, supported by the tip of the thumb, with the index finger resting on the top of the pencil.

989. In Fig. 2 we have practically the same position, only that the index finger slightly laps over the pencil. Either one of these positions is practical, and one should use that position which feels most comfortable to the hand. In Fig. 3 is shown the method of holding the etching knife for shaving and scraping, or, using its technical term, etching the negative.

CHAPTER XLIII.

Negative Retouching.

Applying the Lead to the Regular Negative.

990. **The Secret of Retouching.**—The secret of retouching lies in the ability of the student to control the movements of his hand so as to give the proper touch and correct stroke in the right place. Make the stroke the *right length,* in the *right place,* of the *right weight,* and in the *right direction.* Although the stroke is a very important feature, and one that should receive first consideration, you should not think that there are certain set forms that you must always follow. A large number of retouchers advocate one particular stroke for all kinds of work, but an artist will admit that the stroke to use is the one that will most quickly remove the imperfections. For this reason a curved stroke will most always be found the one to use, because it conforms more nearly to the shape of most spots that have to be eliminated.

991. **Practice Negatives.**—The negatives selected for your first work, at least, should be sharply focused portrait negatives, preferably of coarse-featured subjects. It would be an excellent plan to select a proper subject of this kind and make a number of negatives for retouching practice. They must be fully exposed and carefully developed. Should you not be in a position to make these negatives yourself, discarded portrait negatives may be procured from any local photographer. When selecting negatives for practice work, it is advisable to select cabinet plates of good-sized heads and of subjects with as many blemishes on the face as possible, as the beginner will observe his progress more readily on this class of negatives than if plates with less imperfections were selected.

992. **Preparing the Negative for Retouching.**—The film of the negative in its natural state, as you have previously learned, has not sufficient "tooth" to receive the lead; therefore, a preparation must be applied which will supply this tooth and place the negative in a condition whereby any amount of lead may be applied to the surface. To produce this tooth we applied a retouching medium, or, as it is sometimes termed, a retouching dope, instruction for the preparation of which is given in Paragraphs 957 to 959, and the method of applying it in Paragraphs 960 to 963.

993. Prepare the negative with the retouching dope in exactly the same way as instructed for the preparing of the retouching chart. If, after the first application, the surface is not as you think it should be, repeat the experiment until you are able to secure an excellent surface—one that will be smooth and take the lead.

994. With the negative properly prepared for receiving the lead, and before attempting to apply any work upon it, a proof-print should be made. Print to a good depth, so as to show all the imperfections to their best advantage. This print will serve as a guide for you to follow, and must be kept from direct rays of light as much as possible.

995. **Proofing Negatives.**—For the benefit of those who have had no experience in proofing negatives, we supply the following information: The proof is made by placing the negative which is to be retouched in an ordinary printing-frame, with the film side facing up. A piece of printing-out paper, glossy or matte surface, such as Solio or Aristo Platino, is then placed in contact with the film side of the negative, and the back of the printing-frame fastened in position. Regular cabinet-size proof paper can be purchased of any supply dealer, in boxes containing one hundred sheets. When the back has been fastened in the frame, expose the paper to daylight or sunlight until it blackens over in the shadows. With an average negative it will require, if placed in bright sunlight, from 3 to 10 minutes to print to the proper stage.

996. The print should be examined, from time to

time, by opening one-half of the back of the frame and then raising the end of the print from the negative. *This should be done in very subdued light.* Never open the printing-frame in too strong a light, as strong light will, of course, fog the high-lights. Only print until the high-lights are faintly tinted and the blemishes appear quite prominently. Then the printing is completed and the print may be taken from the frame.

997. With the proof obtained, next place the negative over the opening in the retouching desk and with the pencil properly sharpened to a fine point, you are ready to begin your work. Cover the negative with the black mask containing the oval cut-out. This will prevent finger marks on the film and will assist in concentrating the light on the part which is to be retouched. Before beginning the work, just remember that, on the practice-charts, the strokes of the lead when applied to the transparent blemishes, produce dark lines, the density of which depends upon the weight of the stroke. This lead, when applied to the negative, also gives dark lines, and when shown in the positive print made from the negative, reproduces white; consequently, when referring to these lines on the negative, we speak of them as white lines.

998. **The Position.**—Retouching requires quite a steady hand, and to acquire this, an easy, unrestrained sitting position is necessary. Select a chair of a height that will permit of the elbow resting comfortably on the table, allowing the hand and pencil to rest on the mask and negative. If the hand perspires freely, a handkerchief may be used between the hand and plate, on which to rest the fingers. A small pad or cushion may be placed under the elbow. Sit quite erect in the chair, resting comfortably, and do not bring the face too close to the negative, but just close enough so that you can see all the blemishes. The farther away you can work and see the blemishes, the better.

999. To start with, we would advise that you begin the work at the highest points of light on the negative (the

blackest or most opaque portions). In some portion of the high-lights select a large freckle or blemish. Make no attempt to fill it up solid, but break it up, so to speak, by applying different strokes of the pencil.

1000. **The Stroke.**—The spots and blemishes, being of different shapes and sizes, will require different strokes of the pencil. Some portions may require a series of straight or slightly curved lines placed quite close together, and crossing each other so as to break up the blemish rather than to fill it in solid. Small blemishes may be easily removed by using one or two small commas. Various workers have different methods of handling these imperfections, but there is no marked advantage in any one particular form over another. Whatever stroke you use it must be such that you cannot see it when the negative is held a foot from you, nor must the strokes be visible in the print. Three or four strokes will often suffice to make the average freckle almost unnoticeable. Always guard against placing too much lead on the negative; strive to remove the imperfection completely, using as few strokes as possible. *The weight of your stroke* will govern this to a great extent.

1001. Use any movement you see fit. It makes no difference how you perform the work, so long as you produce the results of filling in and smoothing over. *Always steer clear of the edge of the spot,* for to touch the edge would intensify the outline, consequently, requiring more work on the original blemish. Some of the blemishes or blotches may require only a dot of the pencil; others the spreading of a dot, a zig-zag line, or a curved line or several strokes. The lead must be applied so lightly that while the blemish disappears the strokes are not visible when looking through the negative.

1002. Do just as little retouching as is required in each case—too little is better than too much. It will be found advisable to apply different forms of strokes for various shaped spots or blemishes on different parts of the face. You will soon have a preference for one form of touch over another—finding that this form gives you the greatest

amount of control. More or less unconsciously this will become your method. It is much better to work in this manner than to try using one particular form of stroke from the start. The actual results in retouching do not lie in the particular form of the stroke, but in your being able to use that stroke to secure the required result.

1003. One important point you must remember: *Never permit the lead to touch any portion of the plate which you do not expect to strengthen.* A properly retouched plate, when examined by *transmitted* light, should show no marks of the pencil on the surface. (Note: Transmitted light is that light which comes *through* the negative.)

1004. When you apply the lead to the negative, bear in mind a very important fact: The lead is applied to build up those portions which are transparent and of less density than the main surface of the plate. You must exercise care, therefore, not to apply too much lead. Also remember, that to touch the outline or high-light portions of the blemish, which are the black portions, will intensify these outlines and make them still stronger—this you do not want. What you do desire is to build up and blend only these higher lights. Therefore, avoid working beyond the edge of the blemish. Apply the lead only to the white transparencies, or, giving them their technical term, black blemishes.

1005. Beginning with the center of these blemishes, freckles, lines, or whatever they may be, gradually blend to their edge, connecting them with their surroundings. As previously stated, some of these spots may be very small and require but very few strokes of the lead; others are larger, requiring longer strokes. In any event, never attempt to work beyond the outline of the spot or blemish. If the spot is an irregularly shaped one, follow this shape with the pencil. Do not leave out the corners, but work with any stroke that you find will erase this spot and even it up with the rest of the work. After you have completely finished one spot, take the one nearest to the one already removed and continue with every spot in regular order

until all have been removed. These blemishes and spots you will observe, are not of the same density. Some are blacker (using their technical term) than others. Therefore, you must apply the lead accordingly. The less conspicuous the blemish the lighter you apply the lead.

1006. After removing the most conspicuous spots that are visible to the eye, lean back from the easel and take a general view of the entire surface of the face. You will observe in many instances where you have worked over and filled small spots, you have created larger blotches; that is, you have connected small spots which were more transparent than the larger ones. The latter were invisible to the eye, but after the small spots were removed or eliminated, the larger blotches became visible. In other words, while the large blemish was always present, yet the more obtrusive little spots, pimples, etc., attracted the eye first, so that you did not notice the larger one which was very mild and subdued.

1007. From the fact that this larger blotch—which you have created by the removal of the smaller blemishes—is much larger and milder in appearance, you must lean back farther from your work and, using a longer and lighter stroke, go over the surface you have already worked upon. Fill in this large space and blend it with the remaining surface. Very few of these large spots—which are created from the elimination of smaller spots—will require more than a half-dozen strokes of the pencil.

1008. Practically speaking, the blending together of the created spots is termed *modeling*. It is not desired that you attempt to model at this time. Our object is only to prepare you for the advanced work by calling your attention to these blemishes so that you will observe them as you progress with your practice work. Therefore, all we expect you to do in this lesson is to fill up and blend these little spots, remembering at all times that it requires but very little weight on the pencil to produce the desired effect. Rather depend upon the retouching fluid, which supplies the tooth to take the lead, than upon the pressure of

the hand. Practice eliminating and building up the blotches and blemishes of the face, bearing in mind that the larger the blotch or freckle the longer should be the stroke of the pencil.

1009. Never permit the pencil to touch upon the highlights—in other words, the outline of the blemish. Remember at all times that the object of retouching is to model and smooth over the defects, connecting them with the higher lights, thereby producing an even and clear texture of the skin.

1010. After a careful trial you may find that your work is not producing the desired effect; that it is entirely too heavy and coarse, and that the lead which you have applied has not improved the plate, but, on the contrary, makes the work appear extremely crude and very unsatisfactory. Do not become discouraged on account of this, but erase the work you have done by carefully rubbing over the plate a little absorbent cotton dipped in turpentine. Allow it to dry, after which you can again prepare the plate with the retouching fluid. If so desired, the retouching fluid can be substituted for the turpentine. Apply a few drops of the fluid and spread it with absorbent cotton or Canton flannel, thereby erasing the lead previously applied and at the same time preparing the plate for further retouching. After a few moments the plate is again ready to receive the lead, when you may proceed carefully, as before, and profit by your former experience.

1011. After you have removed the blemishes in the highest points of light, gradually work down through the half-tones and into the shadows. Of course your strokes must gradually become lighter as you proceed to the thinner or shadow portions of the negative.

1012. By the time you have completely removed the blemishes you should have made three or four proofs and compared them with the proof made before any work was applied to the plate. This will give you an exact idea of the effect you are producing with your pencil, and also

clearly show whether or not you are placing too much lead on the plate—whether your strokes are sufficient to remove the imperfections without showing their identity.

1013. If you apply too much lead on one spot it will gradually become glazed over and no more lead will adhere. This difficulty will often occur with beginners and should you experience it, instead of erasing the work already done by applying more retouching dope, flow the plate with the retouching varnish, as previously described in Paragraph No. 964. By using this medium there will be no danger of removing the retouching you have placed on the negative, which would be the case if you applied the dope. You may now continue to apply more lead in the quantity necessary to remove the imperfection.

1014. All of the proofs which you make should be filed in the proof-book, or proof-file, and full data placed on the back of each proof as to the method you employed and the manner in which you proceeded to remove the imperfections. This memorandum is of the greatest importance, as you may desire to refer to it at any future time. By keeping the proofs in your file away from the light, they will remain in practically perfect condition for an indefinite period of time.

CHAPTER XLIV.

Difficulties—Negative Retouching.

Removing Imperfections on Negatives.

1015. **Note.**—Many of the difficulties which may be encountered in preparing the work of this lesson are from the same cause as those given in previous instruction, and in case you meet with any difficulty for which no remedy is given in this particular lesson, refer to the index, which will direct you to the lesson and paragraph wherein you will very likely find your difficulty, prevention and remedy. Only such difficulties as are not covered in previous instruction will appear in this department.

1016. **Applying Dope.**—The dope should be applied by placing one or two drops on the center of the face of the negative, and this rubbed in a circular motion with a very small tuft of cotton or the tip of the finger. Gradually work outward, then back toward the center and outward again, until the dope has become very nearly dry, or until it becomes very tacky. Be careful to avoid any line forming at the outer edge of the area covered by the dope. If in applying the dope you gradually work outward from the center there will be no perceptible line at the edge of the space covered by the medium.

1017. **Applying Varnish.**—The greatest difficulty that will occur when applying varnish to the negative will be caused by pouring from a bottle having too small a mouth. Always keep the varnish in a wide-mouthed bottle. Hold the lower left corner of the negative in your left hand. Pour just enough varnish on the farther right-hand corner to gradually cover the plate. Tilt it first to the left, so that the varnish will run into the farther left-hand corner; then tilt toward you, and finally to the right, allowing the varnish to run off into the bottle at the right-hand corner nearest you.

1018. **Line Around Edge of Dope.**—This will be caused if you do not apply the dope in a circular motion and gradually work outward from the center. With a little practice you should experience no difficulty in this respect.

1019. **Cannot See Imperfections.**—(*a*) You are sitting too close

to the negative, and you see the pencil stroke but cannot distinguish the more delicate imperfections. Sit more erect and far enough away from the negative to allow of your working comfortably. The eyes should be about 18 inches from the negative. (*b*) There may be too much light entering at the sides of your desk and falling upon the face of the negative. All light should come through the opening in the desk and practically all excluded from the sides or back.

1020. **Proper Light.**—No direct light should strike the film side of the negative. The light must be transmitted through the negative by the opening in the desk. An opaque cloth may be thrown over the top of the desk and head. This will assist in excluding all direct light and permit of your seeing the imperfections more easily; also, your eyes will not become tired, as they might if any light were reflected from the surface of the negative. All light for retouching should come *through* the opening in the retouching desk.

1021. **Lead Scratching.**—(*a*) Sometimes there are impurities or hard places in the lead which cause scratches. If these occur you may remove them by rotating the pencil on the piece of emery paper until the hard spot is removed. (*b*) The pencil may be too hard. It is very seldom advisable to use one harder than HHH, and for those who have a light touch even this pencil will be too hard and at times will scratch. An HH or even an H lead may be used very successfully. (*c*) The dope may not have been applied properly, or, if retouching varnish were used, it may not have properly dried. In either case you should be sure that the medium is properly mixed, rightly applied to the negative, and allowed to dry before you attempt to do any penciling. (*d*) Negative damp when medium was applied. The negative must be absolutely dry before applying either retouching dope or varnish. If it is not thoroughly dry the gelatin emulsion will be somewhat soft and the lead will not adhere, and frequently will dig into the emulsion, even though the negative be properly coated with the medium. (*e*) Should the negative become too warm—*i. e.*, if you should work in too warm a room—the medium, unless well rubbed into the film, is liable to be left too gummy—tacky—and the pencil will dig into the medium rather than deposit the lead upon the negative.

1022. **Eyes Becoming Tired.**—(*a*) The beginner will usually strain his eyes in a vain effort to see the various imperfections. This is not at all necessary. In fact, its practice is to be discouraged. Sit back in your chair and proceed to work in an easy manner. Do not try to see too much or to remove too much at the very first. Take your time and proceed in a systematic manner, removing one imperfection before attempting to work on another. (*b*) The eyes will become tired and in time may give you

trouble, if you do not exclude all light from the film side of the negative. You should provide an opaque cloth thrown over the retouching desk and head, so as to exclude all light from the negative which would cast reflections into the eyes. The only light visible should be that which comes *through* the opening in the retouching desk.

1023. **Position at Desk Tiresome.**—Do not have your chair too far away from your retouching desk, as this will necessitate your leaning forward, and this position soon becomes tiresome. Have the chair close enough to the desk to permit of your leaning against the back. Then, sitting at almost arm's length from the negative, you will be able to work for almost any length of time without becoming at all fatigued.

1024. **Fingers and Hand Become Cramped.**—The pencil should be held loosely in the hand, and you should proceed to work in a free and easy manner. If you hold the pencil too tightly, the hand will soon become cramped and you will not have a free movement of the pencil.

1025. **Wrist and Forearm Become Tired.**—It is advisable to have a cushion under the elbow, which will raise your arm to exactly the right position for work. If this is not done the forearm, and even the shoulder, will soon become tired. Both the elbow and wrist should rest in such a way that you may work indefinitely without their becoming at all tired. Cultivate working in the easiest position possible, always sitting erect. This might at first appear awkward to you, but if you do *not* work in this way you will soon become tired, and the hand is apt to become unsteady. There is no need of your being nervous if you use judgment and follow the instruction. It is advisable, especially for your first experiments, to work only a half-hour at a time and then to rest, walking around for a few minutes. Forget your work for the time being, and when you again take it up you will feel somewhat refreshed and not at all tired.

1026. **Finger Marks on Negative.**—The negative should always be covered with the mask, as this will protect it from finger marks. The mask may be made of black or any dark paper; a hole two or three inches in diameter should be cut in the center of an 8 x 10 piece of paper. The mask may be held in position by tacking the upper edge to the desk.

1027. **Cannot Remove Blemishes.**—When working on freckles and extremely transparent portions of a negative, some difficulty may be experienced in building up the transparent spots sufficiently. This may be due to one of two reasons: (*a*) You are working with too hard a lead. (*b*) You are working too lightly and glaze over

the surface before a sufficient quantity of lead has been deposited. The remedies for these difficulties are: (*a*) Use a softer pencil; (*b*) apply the lead heavier.

1028. **Imperfection Becomes Too Black.**—This is due to either using too soft a pencil or working too heavily. The remedy is obvious. Build up the imperfection until it just matches the surrounding tint. Remember, that the blemish is not to be filled in solid, but it should be broken up with strokes that will leave a slight grain effect. When the imperfection is simply a pin-hole in size, one little touch with the point of the pencil may remove it. A stroke conforming in shape to a comma is very effective in removing both large and small blemishes.

1029. **Removing Retouching Medium.**—If too much lead has been applied to the negative, if you have worked on portions that should not have been touched, or if for any reason it is desired to remove the work and begin anew, apply a few drops of the regular retouching dope and with a tuft of cotton or Canton flannel cloth rub over the surface. This will eliminate all the work done and will also again provide the plate with a tooth upon which the lead may be applied. If retouching varnish has been employed instead of the dope, gasoline is the best substitute to use in order to remove the retouching. The cotton should be moistened, but not saturated with the turpentine or gasoline, yet you must use enough of either one or the other to wet up the retouching medium and remove it. Continue rubbing and wiping with the cotton until the medium has been completely removed, then rub dry with clean cotton, after which the plate may again be varnished, or, if desired, dope may be substituted for the varnish.

CHAPTER XLV.

Negative Retouching.

Blending.

1030. By blending is meant the linking together (uniting) of the different blemishes which have been evened up with their immediate surroundings, and bringing them gradually into correct relation with the different planes (tones) of lighting on the face.

1031. Having worked over a number of negatives, you now should have gained considerable experience and be thoroughly familiar with the way to remove blemishes in the most effective way and with the least number of strokes. The next step is to blend and build up the little shadows and the patchy, blotchy effects which still remain.

1032. Your previous work on the practice negatives, eliminating spots, lines, etc., to a certain extent produced others; *i. e.*, by filling in the blemish even with its surroundings, you have done so regardless of the tonal values of the face. Thus the eliminating of a group of little spots on a certain patch of the face left spaces between these spots untouched, which may or may not blend evenly with their surroundings. The blotches usually being of a neutral tone do not appear conspicuously until the more prominent blemishes have been removed or eliminated. Then they begin to show quite blotchy, and it is these that you must now connect together and build up, blending them in correct relation with the different tones of light on the face.

1033. In carrying out the work of this lesson, select one of the practice negatives, or in the absence of glass

negatives you may use the practice-charts, from which you have previously removed the blemishes. If you have not previously done so, make a good strong proof-print from this negative, after which remove the work applied to the plate and again make a proof from the negative in its unworked stage. Carefully file these proofs for your guide in the work of this lesson. With both proofs made you again prepare the plate with the retouching medium. This may be done at the same time that you remove the work of the retouching already done on the plate. By applying retouching medium to remove the lead applied, you at the same time again prepare the plate for work.

1034. With the plate prepared you can now proceed to remove blemishes in exactly the same manner as previously instructed, only that, after eliminating a number of the most conspicuous spots on a small space, you begin at once to blend together all of the work in this space, gradually building up to the highest surrounding tone.

1035. It is always advisable to begin work upon the strongest high-lights, gradually working downward, blending evenly into the shadows. As the forehead bears the highest point of light, we will begin our work here, first eliminating all the little spots, specks, lines and blemishes that are conspicuously visible in the forehead. With these blemishes removed—filled in, etc.—sit back from the easel and observe the general appearance of the space you have worked over. Notice that while all conspicuous blemishes and spots may be eliminated, their elimination has caused larger blotches to appear, which were previously invisible, or, at least, unobserved. These blotches are represented by the spaces between the numerous more pronounced spots. Until these spots are removed, the normal blemishes between the conspicuous spots are not revealed. Therefore, by filling in and eliminating the more noticeable blemishes, you, practically speaking, create larger ones, which become noticeable and must be blended together. This blending produces an even surface to the whole space you have worked over.

CHILD PORTRAIT STUDY

STUDY No. 18

J. WILL TOWLES

PORTRAIT STUDY

STUDY No. 19 JOHN H. GARO

1036. While the work of blending requires careful application, yet the actual work is most simple, as the necessary strokes for the blending may be much longer and more irregular in form. In fact, the only precaution is to avoid working heavily; the blending *must* be done very lightly. Practically speaking, you may work promiscuously, using straight lines, curved lines or zig-zag lines—preferably the latter.

1037. When blending a space, always lean back from the easel so as to obtain a general view of the space you have worked, then freely but lightly apply the lead. Don't be afraid of mistakes, for confidence plays an important part. One should aim to acquire this confidence and it can be gained only by working firmly. At this stage you can proceed in a free and apparently careless manner; in fact, make no effort to produce any particular stroke, but work to produce results.

1038. Experiment by employing different movements, even though you feel the work already done will be ruined. The right method can be obtained only by this experimenting, and as the failures, such as applying the lead improperly—on places where it should not be applied—or overworking the space, are readily apparent, it is easy to judge when the space is evenly blended. After some little practice you will be able to apply just the amount of lead necessary to produce the required results.

1039. As stated in a former chapter, the pencil will invariably lead the hand when you have gained confidence in yourself and unconsciously you will apply the right amount of lead to the right place. At this stage you can do no better than practice any movement, even allowing the pencil to take its own course, but keep it within the limits of the space you wish to blend. After a few attempts and perhaps erasing your work once or twice, you will be able to apply the lead properly.

1040. After having blended the forehead satisfactorily, proceed to the cheek on the light side of the face, working in exactly the same way as you did on the forehead. Al-

ways begin on the highest point of light—the most opaque portion—and work from this point downward to the deepest shadows, first removing the most conspicuous spots and then blending the cheek with the forehead. With this accomplished, continue on the remainder of the cheek, working in patches of say half an inch at a time, blending each patch to the work previously done.

1041. You will observe the light on the face is not all of the same tone. There are strong lights and middle lights, as well as deep shadows. The various degrees of light between the highest light and the deepest shadow are termed half-tones, all of which have their value and must be preserved in their relative order. Therefore, when working in the strongest lights bear heavier on the lead than when working in the half-tones, or middle lights, and very lightly in the deepest shadows. When blending you must hold to the tonal values of the face, thus preserving all the tones or values of the lighting as well as the likeness of the subject.

1042. There are times when negatives of subjects with sunken cheeks or hollow eyes may be improved by building up these hollows and blending them gradually to the next higher tones. Complete information regarding this will be found in the more advanced instruction.

1043. With the forehead and high-light cheek nicely blended, next proceed to the upper lip, then the chin, working down into the shadow and over onto the neck. This will complete the high-light side of the face. Next proceed to blend the shadow side. Blending on the shadow side of the face is a little more delicate work and requires very careful application of the lead, as the negative is much more transparent and the pencil strokes will show on the surface unless you apply the lead very lightly. Do not expect to eliminate the spots with one or two strokes when blending them, for it may require considerable work. Bear in mind, when working on the shadows (thin transparent parts), you must work lightly and the pencil marks must not be visible when viewed on the plate in the easel, but the effect of the work applied should become apparent

by the disappearance of the blemish. It may require a number of strokes to show any perceptible disappearance of the spots or the necessary blending of the blemishes. Therefore, when working on the shadow cheek follow the same method as employed on the high-light side.

1044. Begin on the highest point of light on the shadow cheek and first remove the most transparent spots; then connect the cheek to the forehead by blending with a longer, but much lighter, stroke of the pencil. The shadows being more transparent than the high-lights the spots will appear more transparent, yet they are not so deep and do not require so much work or application of the lead to build them up to their immediate surroundings. For this reason a lighter stroke is employed to eliminate these spots and also to blend the blemishes to the regular tone.

1045. When you have the first patch blended with the work previously done on the forehead, make a proof print from the negative and then proceed to build up all additional patches, connecting them as you work along.

1046. **Working Around the Face.**—To a certain extent the face is round; but the negative being a flat surface, all the features appear on the same plane. The nose, for instance, is apparently on a plane with the ear—it does not stand out from the negative. One of the aims in retouching is to secure atmosphere, or roundness; therefore, try to produce this by working around the face. With a little practice you will unconsciously turn the hand and tilt the pencil slightly, as though the face really did project out of the plate and you were working on the side of it—reaching around the face as it were. When this impression of the work is acquired, or when you consider the negative in this light, you will begin to work with some feeling and understanding as to what is actually required. You will then more readily observe the tonal values as they appear on the face.

1047. You will also appreciate why there is a high-light followed by a shadow in every wrinkle on the face, and in eliminating spots and blemishes, why it is necessary to

work the shadows (transparent parts) and blend them with their outlines or high-lights, *but no more*. Further than this, you will observe that by means of the proper gradation of light the chin is made prominent—projecting from the face—and by means of the shadow from the chin the neck is clearly defined. All this will become quite clear and understandable to you; then retouching will become more interesting and the advanced instruction will be clearly understood and rapid progress made. In fact, when this stage is reached, the most difficult part of the art has been accomplished and your further work will be completed almost by instinct.

1048. The instruction and practice work of this lesson is intended to train you in the work of *blending*, and incidentally give you some impression of the tonal values of the face, which must be preserved. This is particularly dealt with in the advanced instruction.

1049. The work on the nose, eyes and mouth is the most difficult, and, for this reason, no attempt should be made to work upon them at the start. The broader surfaces of the face, such as the cheeks, are easier to work, and the required results more readily produced. Therefore, for the practice of blending, the working of the forehead and cheeks is all that need be attempted.

1050. Devote as much time as possible to the practice of blending, making proof prints of your work at different stages, so you may note your progress. It is by careful comparison of the proof with the negative upon which you are working that you will learn the effects of the penciling.

1051. Remember, it is essential to begin at the highest points of light, no matter on what section of the face you are working. With the beginner the stroke is invariably heavy, and the light touch is not easily controlled; therefore, as it usually requires more lead to build up the high-lights than the shadows, the first strokes may be placed on the former without any danger of their showing too heavily. As you continue you will gain better control of the pencil,

and as you gradually work down into the shadows you will be able to use a lighter touch, and thus properly blend into the more transparent portions of the negative.

1052. Follow the directions closely and work conscientiously; then, sooner or later the work will become simple and easy. It is advisable to practice upon the same negative several times, until you become able to accomplish the required results.

1053. Always make proof-prints from each plate before erasing the work done. These proofs serve as your guide, and will prove of valuable assistance to you.

CHAPTER XLVI.

Difficulties—Blending.

1054. **Strokes of Lead Showing Too Prominently.**—Caused (*a*) by bearing on too heavily; (*b*) by using too soft a lead; or (*c*) by sitting too close to your work. (*a*) The pencil should be held loosely in the hand. (*b*) The beginner should use at least an HHH pencil, and after considerable practice may be able to use the HH. The change from the hard to the soft lead should not be made, however, until you have full control of the stroke. (*c*) Do not sit so close to the negative that each individual stroke is seen. Sit erect, with the eyes fully 18 to 24 inches from the negative.

1055. **Working Away from Highest Lights.**—When connecting little patches of work blend and connect each with the higher lights. Begin by working a very little, close to the highest point of light (until you blend the work even to it); then gradually blend away from it until the blending appears uniform toward the next stage of light. By blending downward, following the angle of light on the face, you avoid working in steps, as the work should be lighter as you near the lower or shadow portions.

1056. **Eliminating Transparent Spots Without the Lead Marks Showing.**—In order to accomplish this you must first work lightly. If the light stroke does not eliminate the spot go over it again, applying the lead a little heavier. You must remember that the retouching medium supplies the tooth by means of which the lead takes to the spot. When the lead is applied too liberally you will find yourself working on a lead surface which has become smooth and has no tooth, finally causing the lead-work to become somewhat transparent. You should judge the weight of the stroke by the density of the spot. If very transparent you may apply a heavier stroke than if only faintly visible. By applying a moderate amount of lead with each stroke you avoid overdoing the work. It is always advisable to apply the *first few strokes* lightly, until you can judge, by the results of the light strokes, how heavily you may apply the lead. When the lead is applied too heavily, the stroke will show on the surface (when viewed by transmitted light). It

is, therefore, better to work lightly over the spots several times than to have the strokes show. With very small spots you will find the mere dot of the pencil will be sufficient to eliminate it.

1057. **What Spots to Remove.**—The spots to remove are those which appear white or transparent in the negative. They may be freckles, pimples, blotches, wrinkles or any other blemishes on the face. After these spots have been removed you will find that other spots will make their appearance. These will also have to be eliminated, and it is their removal that is termed *blending*. Longer and more frequent strokes are employed for this part of the work, but you should be careful that the stroke does not go beyond the space you are blending. It is far better to use a short stroke and have perfect control of it, than to go to the other extreme and not secure the proper result.

1058. **Holding the Pencil Properly.**—The pencil should be held in the same manner as you would hold it when writing, but not as tightly. The strokes should be made freely and lightly. With a little practice you will soon adopt the position which is the most natural one for you to use.

1059. **Dope Seems Too Tacky.**—You have either applied too much dope; you have not rubbed it long enough to distribute it properly over the surface of the paper; or the dope has become too thick. One or two drops applied in the center of the face will be a sufficient quantity of the medium. It must be rubbed in a circular motion with a tuft of cotton until it is well distributed over the entire face. Gradually rub outward, continuing the circular motion, so there will be no perceptible line at the edge of the dope. The stopper should not be left off the bottle. If the medium should become thick, setting it in a warm place will often thin it. If, however, it does not do so, add a few drops of spirits of turpentine direct to the dope, thoroughly mixing them.

1060. **Lack of Sufficient Tooth.**—If you do not use enough retouching dope the surface of the plate will be too smooth. If you work too long on one spot on the negative the film will become smooth and not take the lead. The only thing to do in such a case is to remove all the work and begin over.

CHAPTER XLVII.

Retouching Landscape and Architectural Negatives.

1061. A very mistaken idea seems to prevail among a large class of workers, that retouching applies only to portrait negatives. It is a fact that there are very few negatives produced that could not be improved in one way or another, if ever so slightly, by a certain amount of penciling or etching as well as other hand work. Little defects are bound to present themselves, which, if left in the negative, may entirely ruin what would otherwise be a very pictorial effect. Then again, there are many subjects which could be greatly improved if one only knew the manner in which to make the necessary alterations.

1062. **Landscape Subjects.**—The chief defects in landscape negatives, from the standpoint of the artist, are halation; too much or too little intensity; over-strong highlights or shadows; lack of clouds through over-exposure of sky; blurred figures and trees; light streaks from faulty plate-holders; undesirable loss of detail through hazy spots; imperfect lighting of subjects; lack of definition at the edges, due to imperfect covering of the plate by the lens used, etc. All of these defects may be remedied more or less by proper treatment.

1063. There are various ways of accomplishing the desired result, but the manner of proceeding to work upon the negative to make the necessary alterations is practically the same as that for the retouching of the portrait negatives. Etching receives first consideration, and then the reducing paste is applied where necessary, the paste, of

course, always being used after a certain portion has been etched, in order to smooth up the raggedness that might have been caused by the use of the knife. The application of the lead to the mediumed film is the last step, with the exception that at times it will be found necessary to use what is known as "splatter" work on the glass side of the negative.

1064. **Architectural Subjects.**—The alterations necessary in negatives of buildings and various architectural subjects are somewhat different than those required in landscape and other exterior work. There are two distinct reasons for photographing an architectural subject, the first being to produce a technical record of the subject, which necessitates obtaining minute detail in every feature; the second, being simply to secure artistic interpretation of the subject.

1065. The greater portion of the necessary hand-work on architectural negatives is the straightening and strengthening of lines, accentuating of high-lights and shadows, and the removing of any defects which might have occurred during the process of manipulation, such as pin-holes, air-bells, light fog, etc.

1066. **Etching.**—In landscape work the knife will be chiefly required to remove specks, high-lights on leaves, and for sharpening moved figures. Where figures or objects have moved, the double outline in the denser portions must be cut away and such shadow detail as may have been marred by the movement put in with light touches.

1067. The negative should always be carefully studied before attempting work on it. First decide what obnoxious patches of light should be removed or subdued in the lights and shadows. Both the etching knife and the reducing paste will come into play here. The latter is very essential where large patches of light are to be reduced, as, especially for the beginner, an even reduction is much more easy to secure with the reducing paste than by employing the etching knife, for it requires much more practice with the knife, to become skillful, than with the reducing paste.

You should, however, practice as much as possible with the use of the knife, for it is by practice only that you will master it.

1068. The Schriever Reducing Paste is a most excellent medium to employ for this purpose. You can secure this paste from the American School of Art and Photography for 25c. a box. There are times when portions of the negative may be reduced by the application of pumice-stone or rotten-stone (the latter being of a much finer grain), a piece of cotton being dipped in absolute alcohol (not methylated) and this, in turn, in a little of the powdered stone. This mixture should be evenly applied by friction to only that portion of the negative that you desire to reduce. When the density has been cut down to the required depth you can wipe the powdered stone from the negative with alcohol, and then if the appearance is satisfactory, proceed to work on the patch of light which you wish to subdue.

1069. **Reducing Hight-Lights and Fog.**—The process just mentioned can be employed to remove fog and halation, and to reduce high-lights or a streak of light crossing the negative caused by using an imperfect slide in the plate-holder. This latter, however, is a very difficult thing to rectify. It will be found best to work upon the broader patches with either the alcohol and pumice or rotten-stone or the reducing paste, but the narrower portions should be handled with a pointed piece of India rubber charged with dry pumice or rotten-stone, or a small stump may be employed to apply the reducing paste. No matter how much care you have exercised in removing a streak, it will, no doubt, be necessary for you to pencil and blend certain portions afterward in order to remove all trace of it. A stump dipped in fine pencil filings may assist in slightly building up certain portions which you may have reduced too far.

1070. When working on high-lights you should not only consider their density, but you should also observe the range of gradation from the highest point of light to the deepest shadow and strive not to flatten or destroy the

roundness which originally existed in the negative. Your aim should be to produce as much of an atmospheric effect as possible, by softening the outlines of more distinct objects in the landscape scene.

1071. In technical architectural subjects, less attention should be paid to the matter of atmospheric effect and your thought concentrated on producing as strong and clear detail in the high-lights and in the shadows as possible. You must aim in such architectural subjects to exactly reproduce the original and make a perfect record of it. When the making of such records is not required, but, on the other hand, a more artistic result is wanted, it is permissible to work along somewhat different lines. The technical view must be absolutely sharp in every portion, while the artistic subject demands only the foreground in sharpest focus, the portions toward the background and farthest from the camera gradually becoming diffused.

1072. The retoucher must bear these points in mind when working on different classes of negatives, for it is just as essential to carry out the sharp idea in the technical negative as to aim for diffused effects in the artistic one. In every case it is necessary that the negative should have been correctly exposed and developed. If for any reason the photographer has failed to do his part, the retoucher must correct his mistakes, building up detail in those portions which lack it and accentuating high-lights which have not been properly built up in developing.

1073. Sharp lines which need reducing should be worked on with the point of the etching knife, while broader portions will be best handled by scraping with the flat, or perhaps the curved side of the knife.

1074. **Penciling.**—When the process of reduction has been satisfactorily accomplished, the retouching dope should be applied to the negative, and whatever detail needs strengthening must then be worked in with the pencil. The pencil must be sharpened in two ways. In fact it is desirable to have two different leads, yet one lead may answer the purpose if you wish to use the two ends. One

end should have a round, moderately fine point, similar to that used in regular retouching, and the other should have a flat-edge shape as employed by draftsmen, the latter being especially useful for inserting detail in foliage and in building up or accentuating straight lines. As a rule, a fairly soft pencil should be employed, such as a B or BB lead. There is not so much danger of the pencil strokes showing in the work on landscape negatives as on the face of the portrait negative, for in landscape and architectural subjects you have to deal more with straight lines rather than with building up broad portions.

1075. **Retouching Trees.**—To successfully retouch trees, you should observe their appearance in nature and use the correct form of touch to bring them out properly, just as you would if you were making a pencil drawing. You must remember, however, that you are working on the negative and not on a positive. Sometimes the broad and sometimes the narrow surface of the chisel edge will be most useful, as they enable you to make either broad or narrow touches as required.

1076. For working on such trees as the oak, beech and elm, use the broad edge, while for fir, ash, chestnut and willow the sharp edge will be most serviceable. Use the pointed end of the pencil when retouching birch, weeping willow, poplar and other trees which have fine leaves.

1077. In retouching buildings and other architectural subjects, the chisel edge will, as a rule, be most serviceable in spreading lines and in strengthening outlines. Where signs or lettering appear prominently, it will be necessary, in almost every case, to accentuate the high-lights on the letters, in order that they may stand out more boldly than they would if left untouched. This lettering is, as a rule, a very important part of the technical architectural picture, and it must be perfectly clear and distinct and attract attention. When you observe these signs on a building itself, they stand out very boldly, owing to the brilliancy of the gilt, of which the letters are generally composed. This yellow, however, reproduces very dark, as it does not

affect the sensitive plate to the degree in which you might think it would. Therefore, it is invariably necessary to build up the high-lights on these letters and also to outline them very carefully on the negative. The high-lights may often be accentuated by reducing the shadows a trifle with the etching knife. This, of course, should be done before attempting to retouch the negative with the pencil.

1078. There are times when the brass or other metallic trimmings on a building will reflect light very strongly—to such an extent that it will be necessary to reduce the strong high-lights formed. Then again, if these same trimmings are in the shade, they may, owing to their color, reproduce altogether too dark and require building up with the pencil to their relative tonal value.

1079. All of the work which will be required on technical architectural negatives will require careful thought on your part. If the best of results are to be secured you should observe the appearance of various architectural subjects, together with their trimmings and ornaments. Notice the effect of various lightings on the subject, as this will do much toward enabling you to gradually improve your work upon the negative and produce the most satisfactory results.

1080. **Working on Back of Negatives.**—It is not necessary to have all of the alterations made on the film side of the negative. In fact, a great deal of work may be applied on the glass side, which will be far more effective in enabling you to secure perfect results than if you attempted to secure the same effect working in detail on the film side. The first step is to coat the glass side of the negative with ground-glass substitute, so that you may have a substance on which to work—one that will hold the materials which you will employ. Although ground-glass substitute can be made, it is far more advisable to purchase it from the dealer in photographic supplies. The prepared medium will give far better results than that which you might mix yourself. If, however, you desire to make your own substitute, we have found the following formula to give excellent satisfaction:

1081. **Ground-Glass Substitute.—**

Gum Sandarac	90 grs.
Gum Mastic	20 grs.
Dissolve in Ether	2 ozs.
Add Benzole	1 to 1½ ozs.

Never use more than 1½ ounces of Benzole—1 ounce will usually be found best. *Benzole* must be *fresh.*

1082. To coat the glass with the substitute you should proceed in exactly the same manner as if you were flowing the negative with retouching varnish. Extreme care must be exercised, however, that none of the substitute runs over on to the film side of the negative, as it would be practically impossible to remove it without damaging the film. Begin to pour the substitute on the corner of the negative farthest from you—holding the negative in the left hand, by the left corner. Pour a sufficient amount of substitute on the negative to permit of its flowing evenly over all portions. Avoid an excess amount, however, as it would then run over on the film side. Tip the negative a trifle to the left, and when the substitute has reached the left corner, again tip the negative so that the substitute will run toward your left hand. Just before it reaches the thumb again tip the negative to the right and allow the substitute to quickly drain back into the bottle. The substitute sets very quickly; therefore practice the operation until you become somewhat dexterous in evenly coating the glass.

1083. Avoid coating any part of the negative twice with the substitute, as this would, of course, increase the density of that particular portion. If you will carefully follow out the above suggestion, you should experience no difficulty after a few attempts in applying the ground-glass substitute evenly.

1084. To accentuate shadows—that is, to cause a deeper printing of them—take the etching knife and cut away the ground-glass substitute directly over them, carefully shading or blending around the edges of the opening thus produced. As the thickness of the glass will cause a slight diffusion, you should not make this opening quite as large

as the shadow which you wish to accentuate, for if made too large a slight line may result and ruin the shadow portion. High-lights are built up by working on this ground-glass substitute with a stump dipped in pencil filings, but where fine lines are to be strengthened, a soft pencil may be used to advantage. The amount of work necessary will depend entirely upon the results which you desire to produce, and it may be necessary to make proofs from time to time, in order to learn exactly what is the effect of the work that you have placed on the negative.

1085. Another favorite method of working on the negative is to apply a sheet of cepa-skin (French onion-skin) paper, or very fine grained tissue-paper, to the back. This paper is sometimes known as papier-mineral. Cut a piece of this paper the size of the negative to be worked up, lay it in the water for a moment, and then place between blotters. Around the edge of the negative, on the glass side, apply a little mucilage or weak glue. Lay the damp sheet of tissue-paper on the negative, pressing it down slightly on the gummed margin, and set up on edge to dry. It will dry in a very short while, and the tissue-paper will be found to lie perfectly smooth and be tightly drawn.

1086. The tissue-paper lying over the dense parts of the negative, or over parts which are to be printed deeply, can be cut out with a sharp knife; or, if a knife is not handy, or it is not desired to cut the paper, a solution of one part of balsam to six parts of turpentine can be applied to the paper, which will cause it to become transparent. Other parts of the negative which require lightening can be worked up with a stump, rubbed in pencil filings, liquid charcoal, or with some light water-color. This tissue-paper backing will give the same effect as the ground-glass substitute, but in an increased degree.

1087. In many pictures, more especially those made with hand cameras fitted with ordinary rapid rectilinear lenses, a decided darkening will be noticed in the corners of the print. This is caused by the inability of the lens employed to carry the light to the corners or edges of the plate

in the same strength as to the center. The negative of such a picture will be found to be almost clear glass at the corners. This can be remedied by applying charcoal with a stump to the paper backing of the negative, blending it down from the corners toward the center of the negative. In this way the unevenness of the negative can be removed so that the print shows no defect of the lens.

Illustration No. 32
Pencil for Marking on Glass
See Paragraph 1088

1088. Although the above methods are by far the most practical ones, it is possible to work on the back of the negative without applying any ground-glass substitute. The Faber Company manufactures a special pencil, shown in Illustration No. 32, which may be used to work in high-lights on the back of the negative, and where only the high-lights are to be strengthened this pencil will be found a very convenient method of securing the desired result.

1089. **Splatter Work.**—There are times when it may be desirable to apply splashes of opaque to lighten portions on the negative or to represent stones, flowers, snow, etc. The best results are secured by taking a fine tooth-brush and, after dampening it, lightly charge with India ink or liquid opaque. The negative should be placed almost flat on the table, film side down, inclining slightly toward you. The portions that are not to be splattered should be covered with a piece of paper. Hold the charged brush over against the negative and bring the teeth of a fine-tooth comb quickly over its surface (drawing it toward you). This will result in a fine spray of splashes, which come from the brush to the negative.

1090. After a little experience this will prove to be an excellent method to employ in giving appearance of flowers over grass. It may be necessary to do a little penciling afterward, however. If applied over water you will produce

the effect of water-weed and lilies. With a little practice you will be able to deposit small splashes over the parts of the landscape farther away from the camera and larger ones in the foreground.

1091. **Pin-Holes.**—To spot out pin-holes, which subject will be considered in the following chapter, you need considerable practice, experimenting with one of your negatives which is defective from pin-holes caused by dust, or one in which exists fine transparent spots, due to air-bells. Make a proof on glossy printing-out paper of this negative, so as to show the existing defects as strongly as possible. Then place the negative in your retouching desk and proceed to pencil or remove, or build up, the transparent spots.

1092. **Accentuating Details.**—The average landscape negative can be very much improved by some little retouching, or "dodging," as it is usually called. Glints of sunlight on the tree trunks can be brought out prominently, giving snap and sparkle to the scene; touches of high-light here and there on the leaves; or reflections on water intensified, all help to make a picture more lively.

1093. **Adding Sky to Landscape.**—But no landscape picture can be considered complete without it has some form of a sky, or at least a sky value. A method of introducing a sky into a picture which otherwise shows nothing but blank paper in that portion will be found described in Volume III, but another method frequently used and capable of giving very fine results is the following: Make or select a sky negative which is in keeping with the character of the landscape negative with which it is to be fitted. Make a transparency of the landscape negative, keeping the sky portion very clear. (If necessary use a little Ferricyanide of Potassium Reducer, to reduce the sky.) Next make a transparency of the sky negative, laying the landscape transparency film to film with the plate on which the sky transparency is to be made. The image on the landscape transparency will prevent the sky negative from printing on the sky transparency, and you will have

a perfect match. When finished, bind the two transparencies film to film, and make a negative by contact or by projection, which will then show the combined landscape and sky negatives with no objectionable joint lines showing. The slight diffusion caused by the thickness of the glass will be no detriment to the picture. On the contrary it will lend atmosphere and pictorial charm.

1094. **Avoid Over-Retouching Which Produces False Effects.**—It is a very easy matter to overdo dodging or retouching landscape negatives, and so produce a false effect. Much of the work shown at exhibitions is overdone, giving a pleasing effect at first sight, but easily degenerating into a staginess and unnaturalness which deceives no one. A careful study of all nature effects should precede any attempt at extensive retouching or modeling of a landscape picture.

1095. With practice, close attention to values in nature, and a thorough understanding of what it is you desire to reproduce in your pictures, you will soon be able to take almost any negative, however flat or harsh it may be, however lacking in tone values or over-filled with detail, and make of it a most presentable picture; but, as we stated a few lines previously, you should never attempt to produce an effect contrary to nature. A striving for a sensational or bizarre effect will only bring ridicule from those who understand the real harmonies of nature.

1096. All of your first work should be proofed before attempting to modify the negative, also after having completed your work. If any special alterations or methods of procedure were employed, you should make full mention of them on the back of the proofs, and when these are filed in your proof-file they will prove of value for reference.

Negative Varnish.

There are a great many different kinds of negative varnishes—some are applied to the negative cold, while for the application of others it is necessary to heat the negative. The following formulæ will be found to give per-

fect satisfaction, if the directions accompanying each are carefully carried out:

COLD VARNISH.

Best Grain Alcohol .....20 ozs.
Crushed Dark Shellac .....1 oz.

Shake occasionally for several days until dissolved (without heat). Allow it to settle; then decant carefully from the settlings and add two drams of oil of lavender. The negative should be slightly warmed before varnishing.

COLD VARNISH.

Sandarac .....1 oz.
Mythelated Chloroform .....6 ozs.

Shake until dissolved, then filter.

NEGATIVE VARNISH APPLIED WITH HEAT.

Shellac .....3¼ ozs.
Sandarac .....¾ oz.
Mastic .....40 grs.
Castor Oil .....1 dr.
Rectified Spirit .....30 grs.

Dissolve and filter.

HOT VARNISH.

Sandarac .....1¼ ozs.
Benzoin .....6 grs.
Alcohol .....20 ozs.
Oil of Lavender .....4 drs.

Dissolve by shaking, and filter.

Removing Varnish from Negatives.

Immerse the negative in mythelated alcohol for five minutes, and rub with cotton. If any resin remains, add a little ammonia to the alcohol and place the negative in it, rubbing with the cotton. Rinse twice with alcohol and flow water over the negative. The latter should run evenly.

Another method to remove varnish is to prepare a solution of:

Caustic Potash .....1 oz.
Mythelated Alcohol .....10 ozs.
Water .....10 ozs.

Put the negative in a dish, pour on the solution, and gently rock until the varnish is dissolved. Then wash well under the tap.

CHAPTER XLVIII.

HOW THE STUDIES ILLUSTRATING THIS VOLUME WERE MADE.

Study No. 2, title, "Woodland Mist," by W. T. Knox, New York, N. Y. The weather conditions, dull and misty; exposure was made in the morning; lens used, single combination of Zeiss; focal length, 23 inches; stop used, No. 4; exposure given, 4 seconds; plate used, Cramer Instantaneous Isochromatic; developer, pyro. Diffusion was obtained in focusing on the foreground. Printing process, platinum; mounted on a dark grey mount.

Study No. 3, title, "Morning Lights and Shadows," by J. H. Field, Berlin, Wis. Weather conditions, sun shining through the mist; time of day exposure was made, about 6 A. M.; lens used, Rapid Rectilinear, using rear half of lens only; focal length, 15 inches; stop used, wide open; exposure given, 1 second; plate used, Cramer Medium Isochromatic; developer, pyro-acetone. The diffused focus in this picture was obtained by printing through celluloid and thin paper. The negative was slightly reduced in the sky portions after development. Printing process, Willis & Clements Platinum, black and white. This print was made from an enlarged negative, the original size of which was 5 x 7; mount was on oil tissue paper over cream.

Study No. 4, title, "At Peace (War ship)," by Dr. A. R. Benedict, Montclair, N. J. The weather was cloudy, with a clear atmosphere; exposure was made at 4:30 P. M.;

lens used, Rapid Rectilinear; focal length, 6½ inches; stop used, U. S. 4; exposure given, $\frac{1}{25}$ second. Negative was made on an Eastman film; developed with metol-hydroquinone, with no after manipulation of the negative; printing process, the direct print from the negative on velox, redeveloped with Eastman sepia redeveloper. Note: This picture was made from two negatives; that is, the clouds were printed in. Both negatives, however, were taken on the same day, the clouds in one negative and the scene in the other, and then printed in. This scene is on the Hudson river.

Study No. 5, title, "Sheep," by W. E. Bertling, Buffalo, N. Y. Mr. Bertling states: "I use in all my work a Goerz lens, focal length 7 inches, and generally use diaphragms full opening, Forbes dry plates and develop with Pyrocatechin. I obtain my diffused focus by using full opening of lens and focusing upon middle distance. Printing process, usually developing paper of various kinds. In making my picture I always endeavor to get an element of sky effect in my landscapes, and always give plenty of time in exposure up to a reasonable limit. I always start development with weak developer and strengthen afterwards to suit requirements. For personal use and exhibition purposes generally I use the carbon process or glycerine platinum process. I generally try to work out the salvation of my subject in the printing process. The various kinds of pigment processes offer a wide field for manipulation, and this advantage possesses an attraction for me."

Study No. 7, title, "Snow Lights," by Geo. H. Scheer, M. D., Sheboygan, Wis. Hung at the Fourth American Salon. This picture was made on a very bright sunny day, at about 3 P. M., in the month of March. Lens used, Rapid Rectilinear, wide open; plate used, Orthonon; exposure given, one second, with Burke & James Ideal Ray Filter; developed in dilute pyro-soda developer. Print was made by straight enlargement from an unaltered negative; enlargement was made on Platinoid Bromide, 10x12 inches, from only a portion of a 5 x 7 negative.

Study No. 8. By John Chislett, Indianapolis, Ind. Title, "On the Frozen River." This picture was made on a very cold day at 3 P. M., sun shining faintly; lens used, Goerz, full opening, and an Ideal color screen; exposure given, 1 second; plate used, Cramer Instantaneous Isochromatic, developed in ortol; print was made on platinum paper and the negative was manipulated on the back to lighten up the water and trees. The highlights are in the negative and are untouched in any way; print is mounted on a simple gray mount with black pencil lines. (See Page No. 191.)

Study No. 9. By E. A. Brush, Minneapolis, Minn. This picture was made in an operating room 21 x 44 ft., with a single slant light 15 x 18 ft., light used wide open with a light controlling screen; lens used, 3 A Dallmeyer; plate used, regular single coated, developed in pyro and printed on Angelo platinum paper. The portrait effects are all obtained in the printing. (See Page No. 192.)

Study No. 10. By Mathilde Weil, Philadelphia, Pa. Outdoor portrait. This picture was made out of doors on a 6½ x 8½ plate with a lens of 12 inch focus, used at f. 8, its widest opening. Seed 27 Gilt-Edge plate was used and developed in Metol-Hydroquinon developer. The print was made on Japanese tissue, sepia tone, mounted triple combination—first white, second nile-green, third, deckled tissue over dark strawboard; final mount, light strawboard. (See Page 223.)

Study No. 11. By Mrs. Nancy Ford Cones, Covington, Ky. Subject, "Knitting." The exposure was made in the home at 2 P. M., weather conditions bright. The lens used was a Bausch & Lomb Rapid Rectilinear; stop used, U. S. 4; exposure given, 5 seconds; plate used, Cramer Banner, developed with Metol-Hydroquinon; printing process, Aristo-platino, sepia tone, mounted on sepia mount. (See Page 239.)

Study No. 12. By Mrs. Nancy Ford Cones, Covington, Ky. Subject, "The Splinter." The exposure was made at 11 A. M., on a cloudy day; lens used, Bausch & Lomb Rapid Rectilinear; stop used, U. S. 32; exposure given, 2 seconds; negative was made on Eastman Non-Curling film, developed with Metol-

Hydroquinon; printing process, Aristo-platino, sepia tone, mounted on sepia mount. (See Page 263.)

Study No. 13. By Wm. H. Phillips, Liverpool, Ohio. Title, "East is East, and West is West." Camera used, No. 3 Pocket Folding Kodak; lens used Goerz Series III, 5 inch focus. The negative was made on Non-Curling film, developed with Pyro. The print is a Bromide enlargement made on Royal Bromide, developed in Rodinal strong solution—one part Rodinal, 6 parts water. (See Page 275.)

Study No. 14. By H. B. Conyers, Urbana, Ohio. Title, "The Last Sheaf." The exposure was made on an August day in the afternoon, with very dull light. The lens used was a Tessar fitted to a 3¼ x 4¼ kodak, used full open; exposure given, ¼ second. The print is an enlargement on Bromide paper and mounted on carbon-brown. (See Page 289.)

Study No. 15. By Will H. Walker, Portland, Oregon. Subject, "Marguerite." The picture was made on a bright June morning; exposure was made at 5:30 A. M.; lens used, Zeiss, No. 7; focal length, 8½ inches; stop used, f. 8; exposure given, 1-5 second; plate used, Hammer Non-Halation; developer, Pyro, weak with no after manipulations; printing process, Aristo-platino. (See Page 307.)

Remarks. This picture was taken in the early hours of the morning to avoid interruption by passing people. The picture is mounted on a very warm sepia mount.

Study No. 16. By Alfred Holden, Philadelphia, Pa. The exposure was made in an ordinary sitting room, 9 x 12 feet; style of light used, ordinary window with an open light; lens used, Voigtlander Collinear Series II, No. 5, focal length 8½ inches; stop used, f.6; exposure, 5 seconds; plate used, Cramer Crown; developed in Pyro-soda with no after manipulations; printing process, Artura Iris, toned in sepia; mounting, dark cream portrait, warm sepia tone. (See Page 317.)

GENERAL INDEX

VOLUME II.

Abrasion Marks on Gaslight Papers, Overcoming 524-526
Accentuating Details in Landscape Negatives 1092
Acetic Acid, Nature and Use of.....429
Acid Fixing Bath 116-118
Acid Fixing Bath—Gaslight Papers.....Page 177
Acid Hypo Fixing Bath for Gaslight Papers 403-406
Acidified Rinse Water for Gaslight Papers.....442
Action of Carbonate of Soda.....102
Action of Light on Dry Plate as Compared to Printing-Out Paper 192-193
Action of Old Developer.....35, 36
Action of Pyro Developer 108
Action of Reducers 262
Adding Sky to Landscape.....1093
Advanced Development of Over-Timed Plates.....240-256
Alteration of Developing Formula for Different Brands of Plates.55-56
Alum Hypo Bath Formula .....Page 139
Alum, Nature and Use of 288, 428
Amidol Developer for Enlarging 747, 748
Apparatus—Copying with Hand or View Camera 591, 606, 607
Apparatus for Developing 1
Apparatus, Illustration of Copying .....Page 216
Applying the Lead to the Regular Negative 990-1014
Applying the Reducer to Films.....304-306
Applying the Reducer with the Brush.....296
Applying the Reducer with the Finger, or Tuft of Cotton.....299
Applying the Retouching Dope to the Negative.....960-963
Applying the Varnish to the Negative.....967
Architectural Negatives, Retouching Landscape and.....1061-1096
Architectural Subjects, Retouching.....1064, 1065

Arranging the Camera for Negative Enlarging....887
Artificial Light 900
Artificial Light, Bromide Enlarging by Daylight or....651-770
Artificial Light for Copying....628
"At Peace," Study No. 4, by Dr. A. R. Benedict....Page 79
Avoid Granular Surface by Returning the Plate to the Hypo Bath..298
Avoid Over-RetouchingWhich Produces False Effects....1094
Avoid Printing from Plates Lacking Strength....144
"A Winter Afternoon," by J. S. Neary....Frontispiece

Back of Negatives, Working on....1080-1088
Bath, Acid Fixing....116-118
Bath, Fixing 57, 58
Best Time to Reduce Plate or Film 264
Bleaching and Re-Developing Process, Rapid Sepia Tones by the 778-788
Bleaching Solution for Re-Developing Gaslight Prints....556
Bleaching Solution for Re-Developing Process....782, 783
Blending—Difficulties 1054-1060
Dope Seems Too Tacky....1059
Eliminating Transparent Spots Without the Lead Marks Showing 1056
Holding the Pencil Properly....1058
Lack of Sufficient Tooth 1060
Spots to Remove, What....1057
Strokes of Lead Showing Too Prominently....1054
What Spots to Remove....1057
Working Away From Highest Lights....1055
Blending—Working Around the Face....1046-1053
Blisters 733, 851
Blisters—Re-Developing Process....787
Blue Tones on Bromide Paper, Bright....789
Blue Tones on Bromide Paper, Deep....791
Board, Copying 594, 595
Bolting Cloth for Enlarging....759-761
Box, Washing....16
Brands of Gaslight Papers.... 384
Brief General Instruction—Bromide Enlarging with Enlarging Lantern 681-685
Brief General Instruction—Copying with Hand or View Camera 591-605
Brief General Instruction—Dry Plate Developing 1-61
Bromide and Negative Enlarging....21
Bromide, Effect of, on Tone of Gaslight Print....431
Bromide Enlargements, Washing 749

Bromide Enlarging Apparatus, Negative Enlarging With a.....891-907
Bromide Enlarging Briefly Described.....658-664
Bromide Enlarging by Daylight or Artificial Light 651-770
Bromide Enlarging by Daylight or Artificial Light—Introduction 651-657
Bromide Enlarging—Detailed Instruction.....721-770
Bromide Enlarging—Difficulties 808-832
Blisters 819
Contrasty Prints 824
Dark Prints 818
Difficulty in Judging Which is the Sensitized Side of the Paper 827
Enlargement Reversed from the Original Negative 828
Enlargement Sharp in the Center, But Out of Focus at the Edges 821
Flat Prints 823
Green Tones 822
Hair Lines, Like Fine Pencil Marks, on Enamel Bromide Paper 830
Image Appearing Upside Down on the Enlarging Easel...829
Mealy, Mottled Prints.....808, 809
Not Fixing Properly.....832
Print Develops Weak in Shadows with Gray Highlights..811
Prints Developing Gray Even After Sufficient Bromide has been Added 820
Prints Gray in the Highlights Having Mottled Shadows 812
Prints Refusing to Tone Sepia in the Hypo-Alum Bath....826
Prints Strong in the Center but Weak at the Edges, Appearing Almost Like a Vignette 814
Prints Very Light and Yellow.....815
Prints Weak and Too Light.....813
Prints with Large Yellow Stains of Different Sizes.....816
Sharp Vignettes 825
Small Black or Brown Spots.....810
Small White Spots and Streaks on Matte-Enamel and Platinoid Papers 831
Streaky Prints 817
White Spots 809
Bromide Enlarging Pointers 833-868
Bromide Enlarging, Quality of Negative Best Suited for.....723
Bromide Enlarging With Enlarging Lantern, Brief Instruction for 681-685
Bromide Intensifier, Mercury ....Page 72

Bromide of Potassium in Gaslight Developer, Nature and Use of 425, 430
Bromide of Potassium, Nature of....46
Bromide of Potassium Solution, Mixing 34
Bromide of Potassium Solution, Preparing a Ten Per Cent....201
Bromide Paper, Care of Unused....864
Bromide Paper, Developer for—Metol-Hydroquinon 731, 732
Bromide Paper, Enamel 671
Bromide Paper, "Hard" and "Soft"....666
Bromide Paper, Keeping Qualities of....675
Bromide Paper, Matte-Enameled 669, 670
Bromide Paper, Platino 667
Bromide Paper, Purchasing 676
Bromide Paper, Royal 672, 673
Bromide Paper, Sensitiveness of....677
Bromide Paper, Sensitive Side of 862
Bromide Paper, Special Tones on 789-793
Bromide Paper, Standard 668
Bromide Papers and Their Use, Grades of....665-680
Bromide Prints, Drying 794, 837
Bromide Prints, Ferrotyping 799
Bromide Prints, Mounting 797, 798
Bromide Prints, Obtaining Vigorous....865
Bromide Prints—Quick Development 866
Bromide Prints, Removing Stains from....868
Bromide Prints, Sepia and Green Toned 771-793
Bromide Prints, Spotting or Touching up....803
Bromide Prints, Thorough Washing of....867

Camera for Negative Enlarging, Arranging the 887
Carbonate of Soda, Action of....102
Carbonate of Soda in Gaslight Developer, Nature and Use of 426
Carbonate of Soda, Nature of....46
Care of Unused Paper....864
Caution—Drying Gaslight Prints 447
Caution—Gaslight Papers....389
Caution—Handling Gaslight Paper 407, 441
Chemical Action of Developer 51, 52, 104-106
Chemicals, Developing 13
"Child Portrait," Study No. 18, by J. Will Towles....Page 367
Choice of Gaslight Papers 388
Class of Negatives That Can be Improved by Doctoring....292
Clean Fixing Bath....860
Cleaning Ferrotype Plates 800

Cleanliness 844
Clearing Solution Can Be used Repeatedly Without Renewing.....147
Clearing the Plate After Intensifying 173, 174
Clearing the Plate or Film After Reducing.....270
Coating Mounted Prints so as to Produce a Fine Gloss.....802
Coating Negative—Ground-Glass Substitute 1082, 1083
Cold Hypo Toning Bath for Bromide Papers.....771-774
Color of Plate, Proper..... 50
Commercial Photography, Special Pyro-Developing for 357-379
Condenser 704, 705
Condensing Lens, Illustration of .....Page 259
Construction of Sensitive Emulsion 189-191
Convenient Dark Room, A..... 14
Copying Apparatus for Negatives and Lantern Slides.....Page 312
Copying Apparatus, Illustration of.....Page 216
Copying, Artificial Light for..... 628
Copying Board 594, 595
Copying—Developing 604, 633, 634
Copying—Difficulties 635-650
Copying Water-Color Drawings.....637
Determining What Plate to Use.....647
Determining What Size Stops to Use 648
Knowing What Lens to Use.....649
Lens to Use, Knowing What.....649
Making Copies from Oil Paintings 638, 639
Making Copy Same Size as Original.....636
Obtaining an Image the Size of the Original.....650
Overcoming Distortion 642
Overcoming Grain of Paper in Original Picture.....643
Overcoming Reflection 641
Placing the Original to be Copied in the Proper Light 635
Plate Develops Flat 645
Plate Develops Thin 646
Securing Proper Exposure 644
Securing Sharp Focus.....640
Copying—Exposure 602, 603, 629, 630
Copying, Extension Device for.....622-625
Copying Light, Proper.....596, 626, 627
Copying Old Pictures 601
Copying, Plates to Use for.....599, 631, 632
Copying—Printing 605
Copying, Stops to Use for.....600
Copying The Negative—Negative Enlarging.....907
Copying the Picture 598

Copying With Hand or View Camera 590-634
Copying With Hand or View Camera—Apparatus 591, 606, 607
Copying With Hand or View Camera—Detailed Instruction ...606-634
Copying With Hand or View Camera—General Instruction....591-605
Copying With Hand or View Camera—Introduction 590
Copying With Hand or View Camera—Lenses 592, 608-621
Correct Exposure—Example of.....Page 101
Correcting Distortion—Enlarging 756-758
Cracked Trays 841
Crispness and Snap of Negatives 37
Cutting Paper 863

Dark Room 8
Dark Room, A Convenient 14
Dark Room, Enlarging Department in.....20
Dark Room Equipped for Printing and Developing Gaslight Papers, Section of.....Page 166
Dark Room, Floor Plans of a Convenient .....Page 15
Dark Room Light 9
Dark Room Plans .....Pages 15, 16, 21
Dark Room, Sectional View of Convenient .....Page 16
Dark Room Shelving 18
Dark Room, Size of 10
Dark Room Ventilation 11
Daylight Enlarging, Preparing the Apparatus for.....695-697
Daylight Enlarging with a Pocket Film Kodak.....686-694
Daylight Enlarging with View or Hand Camera—Detailed Instruction 695-707
Daylight or Artificial Light, Bromide Enlarging by.....651-770
Daylight, Use of Home-Made Enlarging Camera With.....717-719
Department of Printing and Developing in Dark Room.....19
Desk, Illustration of Retouching.....Page 339
Desk, Object of Retouching.....953
Desk, Position at the Retouching.....998, 999
Desk, Retouching 973-977
Detailed Instruction—Bromide Enlarging 721-770
Detailed Instruction—Copying With Hand or View Camera.....606-634
Detailed Instruction—Daylight Enlarging With the View or Hand Camera 695-707
Detailed Instruction—Dry Plate Developing 8-61
Detailed Instruction—Gaslight Printing and Developing.....409-454
Details in Landscape Negatives, Accentuating 1092
Developer, Agitate 847
Developer, Chemical Action of.....51, 52, 104-106
Developer for Bromide Paper, Metol-Hydroquinon 731, 732

Developer for Enlarging, Amidol 747, 748
Developer for Enlarging, Non-Poisonous 746-748
Developer for Enlarging, Preparing the.....731, 732
Developer, Hypo in.....859
Developer, Stopping Action of.....834
Developer, Use of Old or Once Used.....196
Developers, General Notes on.....Page 32
Developing 2, 30, 103
Developing Apparatus 1
Developing Chemicals 13
Developing—Copying 604, 633, 634
Developing Different Brands of Plates 198-200
Developing—Enlarging 736-743
Developing Extreme Over-Exposures 202, 203
Developing Formula for Gaslight Paper Post Cards.....584
Developing Formula for Overcoming Halation 370-376
Developing Formula, Universal 328-331
Developing Light 17-835
Developing—Negative Enlarging 898, 899
Developing Normal or Slightly Under-Timed Plates 111-115
Developing Notes for Gaslight Papers 436-441
Developing of Doubtful Exposures 109, 110
Developing or Gaslight Papers—Introduction 380-389
Developing Outfit 12
Developing Over-Exposures 187-210
Developing Over-Exposures—Difficulties 211-239
Action of Developer on Over-Exposed Plates 211-216
Clearing Stained Negatives.....236
Desired Amount of Bromide to Use 229
Determining When to Check Development of a Plate Started in Normal Developer 235
Developing Plates of Doubtful Exposure 217
How Far to Carry Development of Plates that are Over-Exposed 227, 228
How Long a Plate Should Remain in the Bromide 230, 231
Judging During Development How Much the Plate is Over-Exposed 218-220
Large Transparent Spots 239
Mottled Negatives 238
Obtaining Clear Shadows 222-226
Obtaining Desired Contrast of Over-Timed Plates.....221
Preserving Old Developer 234
Uneven Development 237
Using Old Developer 233
Yellow Negatives 232

Developing Outfit for Gaslight Paper Post Cards 578, 579
Developing Sink 15
Developing, Theory of 22-25
Developing the Transparency—Negative Enlarging 881
Developing Under-Exposures 95-118
Developing Under-Exposures—Difficulties 120-128
Blisters Forming on Plate, Little.....125
Negative Drying With Too Much Grain 120
Negative Flat 127
Negatives Fogging During Development 126
Negatives Lack Strength and Snap 128
Plate Developing Only Partly, and Then Stopping.....122
Plate Frilling 124
Shadows Lacking Detail 123
Yellow Negatives 121
Developing, Universal 322-341
Developing, Use of Two Trays for.....197
Development of Over-Timed Plates, Advanced.....240-256
Development, Restraining 32, 33
Difficulties—Blending 1054-1060
Difficulties—Bromide Enlarging.....808-832
Difficulties—Copying 635-650
Difficulties—Developing Over-Exposures 211-239
Difficulties—Developing Under-Exposures.....120-128
Difficulties—Dry Plate Developing 62-94
Difficulties—Intensifying 155-167
Difficulties—Local Intensifying 179-186
Difficulties—Manipulating Gaslight Papers.....455-480
Difficulties—Negative Enlarging 908-935
Difficulties—Reducing With Persulphate of Ammonia 317-321
Difficulties—Reducing With Red Prussiate of Potash 307-316
Difficulties—Removing Imperfections on Negatives 1015-1020
Difficulties—Special Printing and Developing of Gaslight Papers 530-551
Difficulties—Universal Developing 342-356
Diluting Gaslight Developer 440
Directions for Re-Developing Process 781-785
Directions for Using Universal Developer 332-337
Discoloring of Hypo-Bath 28, 29
Doctoring White Drapery 293, 294
Dodges for Gaslight Paper, Printing 487-493
Dodging—Enlarging 753-755
Don'ts—Enlarging 762-770
Double Coated Plates 45
Doubtful Exposures, Developing of 109, 110

Drying 6
Drying Bromide Prints 794, 837
Drying Gaslight Paper Post Cards 588, 589
Drying Gaslight Prints 446
Drying Gaslight Prints—Caution 447
Dry Plate Developing—Brief General Instruction 1-61
Dry Plate Developing—Detailed Instruction 8-61
Dry Plate Developing—Difficulties 62-94
Blisters 77
Dense Negatives 86
Discolored Hypo Bath 72
Finger Marks 74
Frillings 75
Granular Negatives, Film Having a Grainy Appearance.... 90
Judging if Plate is Over-Timed 67
Judging if Plate is Under-Timed 66
Judging Proper Strength of Negative 70
Judging When Plate is Fixed 71
Lack of Detail in Shadows 63
Large Transparent Spots Triangular in Form and Irregular in Size 81
Mottled Negatives 73
Negative Drying Too Slowly 91
Negatives Evenly Developed but Drying Unevenly 92
Negatives Full of Dirt and Scum When Dry 93
Parallel Lines on Negatives 87
Part of Plate Stained Yellow 88
Pinholes and Spots 78
Plate Flashing up Quickly and Darkening All Over at Once, Detail Very Dim 65
Plates Slow in Starting to Develop 62
Producing Proper Contrast 68
Proper Color of Negative 69
Properly Exposed Plates Developing Slowly 64
Purple or Dark Opaque Spots, Regular in Size, But Comet or Irregular in Shape 83
Round Transparent Spots 79
Small Transparent Spots Resembling Little Particles of Lint and Dust 82
Small Transparent Spots Triangular in Shape, and Irregular in Size 80
Spots and Pinholes 78
Spots and Streaks, Almost Transparent, on Plates After Drying 89

Thin Negatives 85
Uneven Development 76
Yellow Negatives 84
Yellow Negatives, Even with Sodas of Proper Strength 94
Dry Plate Developing—Introduction .....Page 9

Easel, Enlarging 706, 707
Easel—Negative Enlarging 892
"East is East and West is West," Study No. 13, by Wm. H. Phillips .....Page 275
Edges of Print, Stains on 850
Effect of Bromide on Tone of Gaslight Prints 431
Electric Light, Printing Gaslight Papers With 417-420
Eliminating Undesirable Portions of any Negatives 508-517
Emulsion, Construction of Sensitive 189-191
Emulsion, Restraining the 194
Enamel Bromide Paper 671
Enamel Bromide Paper, Making Prints on 745
Enlargement, Size of the 692
Enlargements, General Finishing of 794-807
Enlargements on Nepera Papers 679
Enlargements on Special Gaslight Paper 678
Enlarging Apparatus for Artificial Light .....Page 257
Enlarging Apparatus Without Condensers, Home-Made, Full Explanatory Details of 713-716
Enlarging Box for Daylight, Illustration of .....Page 256
Enlarging, Bromide and Negative 21
Enlarging, Bromide, Briefly Described 658-664
Enlarging by Daylight or Artificial Light, Bromide 651-770
Enlarging—Correcting Distortion 756-758
Enlarging Department in Dark Room 20
Enlarging—Developing 736-743
Enlarging—Dodging 753-755
Enlarging Don'ts 762-770
Enlarging Easel 706, 707
Enlarging—Focusing 725, 726, 893-895
Enlarging Frame to Hold Kodak, Illustration of .....Page 252
Enlarging, Illustration of Example of .....Page 243
Enlarging Lantern, Illustration of Ingento .....Page 250
Enlarging, Lens for 721, 722
Enlarging—Making the Exposure 727-730
Enlarging, Non-Poisonous Developer for 746-748
Enlarging Pointers, Bromide 833-868

Enlarging—Temperature 750, 853
Enlarging, Trays for 734, 735
Enlarging—Using Silk Bolting Cloth 759-761
Enlarging—Vignetting 751, 752
Enlarging With a Bromide Enlarging Apparatus 891-907
Enlarging With a Pocket Film Camera, Daylight 686-694
Enlarging With Enlarging Lantern—Brief Instruction for Bromide 681-685
Enlarging With the View or Hand Camera, Daylight—Detailed Instruction 695-707
Etcher, Illustration of Holding the Pencil and .....Page 350
Etching Landscape Negative 1066-1068
Example of Enlarging, Illustration of.....Page 243
Explanatory Details—Home-Made Enlarging Apparatus Without Condensers 713-716
Exposure—Copying 602, 603, 629, 630
Exposure, Example of Correct .....Page 101
Exposure for Printing Gaslight Paper 394, 395, 412-416
Exposure for Transparency—Negative Enlarging 879
Exposure, Making the—Enlarging 727
Exposure—Negative Enlarging 896, 897
Exposure of Gaslight Paper, Test for 421
Exposures, Developing of Doubtful.....109, 110
Exposures, Trial.....846
Exposures, Under 38-44
Extension Device for Copying 622-625

Faber Pencil Holder and Leads, Illustration of .....Page 338
Ferrotype Plate, Cleaning 800
Ferrotype Plate, Placing Bromide Print on 801
Ferrotyping Bromide Prints 799
Finest Results 861
Finger Marks 848
Finishing of Enlargements, General 794-807
Fixing 4
Fixing and Washing Bromide Prints 838, 839
Fixing Bath 57, 58
Fixing Bath, Acid Hypo, for Gaslight Papers 403-406
Fixing Bath, Clean 860
Fixing Bath for Gaslight Paper Post Cards.....585
Fixing Gaslight Prints.....443
Fixing, Theory of 26, 27
Fixing the Plate 150
Flattening Unmounted Bromide Prints 795

Focusing—Enlarging 725, 726, 893-895
Formula for Alum Hypo Bath .....Page 139
Formula for Developing Gaslight Papers.....584
Formula for Glue 804
Formula for Ground-Glass Substitute 1081
Formula for Overcoming Halation, Developing 370-376
Formula for Preparing the Acid Hypo Fixing Bath .....Page 177
Formula for Pyro Developer 47-49
Formula for Reducing With Persulphate of Ammonia 277
Formula for Reducing With Red Prussiate 265
Formula for Salt Bath for Enlarging 744
Formula for Strengthening Negatives of Uncertain Fixing 148, 149
Frame to Hold Kodak, Illustration of Enlarging .....Page 252

Gaslight Developer, Diluting 440
Gaslight or Bromide Papers, Sepia Tones on 552-575
Gaslight Paper—Post Cards 576-589
Gaslight Papers, Acidified Rinse Water for 442
Gaslight Papers, Brands of 384
Gaslight Papers—Caution 389
Gaslight Papers, Choice of 388
Gaslight Papers, Developing Notes for 436-441
Gaslight Papers, Grades of.....385-387
Gaslight Papers, Introduction 380-389
Gaslight Papers, Overcoming Abrasion Marks on.....524-526
Gaslight Papers, Printing and Developing—Brief General Instruction 390-408
Gaslight Papers, Proper Light for Developing 392, 409
Gaslight Papers, Special Developing Formula for.....495
Gaslight Papers—Special Development 494-506
Gaslight Papers, Special Printing and Developing of.....481-529
Gaslight Printing and Developing—Detailed Instruction.....409-454
Gaslight Printing and Developing—Practice Work.....452-454
Gaslight Prints, Drying 446
Gaslight Prints, Fixing 443
Gaslight Prints, Marring 445
Gaslight Prints, Removing Yellow Stains from.....521-523
Gaslight Prints, Scum on Surface of 519, 520
Gaslight Prints, Trimming, When Dry..... 449
Gaslight Prints, Vignetting 507-517
General Explanation—Retouching 979-989
General Finishing of Enlargements 794-807
General Negative Intensifying 129-140
General Notes on Developers .....Page 32

Glass, Pencil for Marking on, Illustration of ..... Page 385
Glue, Formula for 804
Grade of Paper to Use 858
Grade of Post Cards 576, 577
Grades of Bromide Papers and Their Use 665-680
Grades of Gaslight Papers 385-387
Greenish Blue and Green Tones on Bromide Papers 790
Green Tones on Bromide Paper 790, 792, 793
Ground-Glass Substitute, Coating Negatives with 1082, 1083
Ground-Glass Substitute, Formula for 1081

Halation, Developing Formula for Overcoming 370-376
Halation—Example of Overcoming in Interior Photography .. Page 145
Halation—Method of Overcoming by Means of Special Development 365-379
Hand or View Camera, Copying With 590-634
Handling Gaslight Prints—Caution 407, 441
"Hard" Bromide Paper 666
High-Lights and Fog, Reducing 1069-1073
Holding the Pencil 988, 989
Holding the Pencil and Etcher, Illustration of ..... Page 350
Home-Made Enlarging Apparatus, Illustration of ..... Page 264
Home-Made Enlarging Apparatus without Condensers 708-720
Home-Made Enlarging Apparatus Without Condensers, Full Explanatory Details of 713-716
How the Studies Illustrating This Volume Were Made ..... Page 389
How to Keep the Reducing Solution 272
Hydrometer, Use of 53
Hydroquinon, Nature and Use of, in Gaslight Paper Developer .. 398, 424
Hypo-Acid Fixing Bath for Gaslight Papers 403-406
Hypo Bath, Discoloring of 28, 29
Hypo Bath, Formula for ..... Page 139
Hypo Bath, Life of 518
Hypo in Developer 859
Hypo in Persulphate Bath, Traces of 281
Hypo-Sulphite of Soda, Nature and Use of 427
Hypo-Sulphite of Soda, Nature of 46, 287
Hypo Toning Bath for Bromide Papers, Cold 771-774

Ingento Enlarging Lantern, Illustration of ..... Page 250
Intensifier, Mercury Bromide ..... Page 72
Intensifier, Monckhoven's Silver ..... Page 72
Intensifier, Preparing the Plate to Receive the 137, 138
Intensifier, When to Apply the Local 177, 178
Intensifier, When to Stop Action of the 140

Intensifying, Clearing the Plate After 173, 174
Intensifying—Difficulties 155-167
Appearance of Old Negative Which Has Not Been Properly Fixed and Washed 166
Intensifier Will Not Work After Using a Few Times 164
Intensifying Solution Becomes Milky 163
Judging When Plate is Carried Far Enough in Mercury 156
Negative Appearing Oily 155
Negative Intensifying in Streaks 162
Negative Intensifying Unevenly 157
Negative Not Clearing in Clearing Solution.....159
Negative Stained After Going Through Clearing Bath—Sulphite of Soda Solution 158
Removing Varnish 167
Small Opaque Spots Irregular in Shape and Size.....163
When to Use Ammonia Clearing Bath 160
Intensifying Formula 135
Intensifying, How to Proceed With 169, 170
Intensifying, Light to be Used While 145
Intensifying, Local 168-178
Intensifying, Methods of 133
Intensifying Negatives While Dry, Locally 175
Intensifying, Plates Becoming Stained by 142
Intensifying, Rocking Tray While 141
Intensifying Solution is Used, Why a Weak 171, 172
Interior Photography, Example of Overcoming Halation in...Page 145
Introduction—Bromide Enlarging by Daylight or Artificial Light 651-657
Introduction—Negative Enlarging 869-881
Introduction—Negative Retouching 936-949

Judging Plates to be Reduced 273

Keeping Qualities of Bromide Paper 675
Keep Prints Immersed 852
Kind of Negatives to Reduce with Persulphate 283, 284
Kind of Plates to Use for Negative Enlarging 874
"Knitting," Study No. 11, by Mrs. Nancy Ford Cones .....Page 239
Kodak Attached to Frame, Illustration of .....Page 252
Kodak, Daylight Enlarging With a Pocket Film 686-694
Kodak Enlarging, Lens for 693, 694
Kodak in Position, Illustration of .....Page 253

Landscape, Adding Sky to 1093
Landscape and Architectural Negatives, Retouching..... 1061-1096
Landscape Negatives, Accentuating Details in 1092
Landscape Negatives, Etching 1066-1068
Landscape Negatives, Pencilling 1074
Landscape Negatives, Pin-Holes in 1091
Landscape Negatives—Splatter Work 1089, 1090
Landscape Subjects, Retouching 1062, 1063
Lead, Sharpening the 985-987
Leads, Illustration of Faber Pencil Holder and ..... Page 338
Learning Retouching 949
Lens for Enlarging 721, 722
Lens for Kodak Enlarging 693, 694
Lens, Illustration of Condensing ..... Page 259
Lens Screen for Enlarging Camera 720
Lens to Use for Negative Enlarging 886
Lenses—Copying With Hand or View Camera 592, 608-621
Life of Hypo Bath..... 518
Life of Re-Developing Bath..... 567
Life of Reducing Solution 272
Light, Artificial 900
Light, Developing 17, 835
Light for Developing Gaslight Paper, Proper..... 392, 409
Light on Dry Plate as Compared to Printing-Out Paper, Action of 192, 193
Light to be Used While Intensifying 145
Light, White 849
Lighting the Original to be Copied 597
Local Intensifying 168-178
Local Intensifying—Difficulties 179-186
Applying the Glycerine Intensifier to Dry Negative Without Effect 185
Glycerine Intensifier Spreading 186
Intensified Portions Stained After Going Through Clearing Solution 182
Intensifier Spreading 180
Judging When Sufficiently Intensified 181
Parts Not Improved by Intensifying 183
Parts Not Improving by Intensifying 179
Plates Refusing to Clear in Clearing Bath 184
Local Reducing 291-306
Local Reducing, Strength of Solution to Use for 295
Locally Intensifying Negatives While Dry 175
Making an Enlarged Transparency 901

Making Prints on Enamel Bromide Paper 745
Making Small Size Negatives from Large Ones 906
Making the Exposure—Negative Enlarging 903, 904
Making the Negative by Contact from the Large Transparencies....902
Making the Transparency by Contact—Negative Enlarging 877
Making Transparencies on Film—Negative Enlarging 905
Manipulating Gaslight Papers—Difficulties 455-480
Blisters 468
Blisters on Sepia Prints 469
Brownish Blacks 460
Canary Yellow Tones, When the Non-Abrasion Bath has been Used, or the Iodide of Potassium has been Added to the Regular Developing Bath 479
Edges of Prints Discolored 473
Fine Black Lines on Surface of Prints 474
Grayish Mottled or Granulated Appearance of Edges or Entire Print 456
Grayish Whites 459
Greenish Yellow Tones Where the Non-Abrasion Developer has been Used 480
Green Tones 458
Milky Deposit on Surface of Prints 471
Mottled Shadows 464
Prints are too Light, Lack Detail 455
Prints Developing Irregular and Freaky, and in Streaks 472
Prints Flat—Lacking Contrast 462
Prints too Black 457
Prints too Dark 465
Round or Irregular Dark Spots 476
Round White Spots 470
Small Black Spots 475
Small Yellow or Purple Stains 466
Too Much Contrast 461
Weak Prints (Lacking in Detail).....463
White Spots Irregular in Shape and Size.....477
White Spots With Heavy Fine Lines 478
Yellow Stains All Over the Print 467
Manipulating the Re-Developing of Gaslight Prints.....561, 562
Manipulation—Re-Developing Process 786
"Marguerite," Study No. 15, by Will H. Walker .....Page 307
"Marine," Study No. 6, by S. I. Carpenter .....Page 119
Marks, Finger 848
Marring Gaslight Prints 445

Master One Brand of Paper 845
Materials Required for Retouching 951
Matte-Enameled Bromide Paper 669, 670
Measure, Fluid 59
Medium, Retouching 955-959
Memorandum Blank for Gaslight Paper 499
Mercury Bromide Intensifier .....Page 72
Mercury, Dissolving 136
Mercury Solution Can be Used Repeatedly Without Renewing 146
Method of Development for Overcoming Halation 365-379
Method of Procedure for Vignetting Gaslight Prints 514-517
Methods of Intensifying 133
Methods of Negative Enlarging 871
Methods of Vignetting Portraits and Eliminating Undesirable Portions of Any Negative 508-517
Metol-Hydroquinon Developer for Bromide Paper 731, 732
Metol-Hydroquinon Developer for Gaslight Paper 396-402
Metol, Nature and Use of, in Gaslight Developer 422
Metol Poisoning 432, 586
Metol Poisoning, Ointment Preventing 433-435
Mixing Solutions 854
Monckhoven's Silver Intensifier .....Page 72
"Morning Lights and Shadows," Study No. 3, by J. H. Field ..Page 61
Mounting Bromide Prints 797, 798

Nature and Use of Acetic Acid 429
Nature and Use of Alum 288, 428
Nature and Use of Hydroquinon in Gaslight Developer 398, 424
Nature and Use of Hyposulphite of Soda 427
Nature and Use of Metol in Gaslight Developer 422
Nature and Use of Sulphite of Soda 46, 289, 423
Nature of Bromide of Potassium 46
Nature of Carbonate of Soda.....46
Nature of Hyposulphite of Soda.....46, 287
Nature of Nitric Acid 46
Nature of Persulphate of Ammonia 286
Nature of Pyrogallic Acid.....46
Nature of Red Prussiate of Potash 285
Nature of Sulphuric Acid 46, 290
Negative and Positive Compared 979-984
Negative, Applying the Lead to the Regular 990-1014
Negative, Applying the Varnish to the 967
Negative Before Retouching, Reproduction of .....Page 343
Negative Best Suited for Bromide Enlarging, Quality of 723

Negative Enlarging 21
Negative Enlarging, Arranging the Camera for 887
Negative Enlarging—Artificial Light 900
Negative Enlarging—Copying the Negative 907
Negative Enlarging—Developing 898, 899
Negative Enlarging—Developing the Transparency 881
Negative Enlarging—Difficulties 908-935
Black Comet-Like Specks in the Enlarged Negative and Also in the Large and Small Transparency 930
Centre of Large Negative Seems to Have More Exposure Than the Edges 926
Enlarged Negative From Transparency Showing no Detail in the Shadows 917
Enlarged Negative Too Gray in Color 920
Enlarged Negative Too Strong in Color—Yellow 933
Enlarged Negative Very Grainy 929
Enlarged Negative Very Thin and Full of Detail in the Shadows 927
High-Lights in Both Transparency and Enlarged Negative Hazy and Flat 918
Judging Proper Illumination When Enlarging From Negative or Transparency by Artificial Light 909
Kerosene Light Flickers 935
Light Transparent Spots on the Transparency 932
Negative From Transparency Flat 916
Negatives That Have Been Properly Exposed When Enlarging From a Small Transparency, or a Transparency That Has Been Properly Exposed When Enlarging From a Small Negative, Appearing Hazy or Fogged 934
Obtaining a Sharp Transparency 910
Obtaining Sharp Enlarged Transparency 911
Overcoming Distortion 912
Pin-Holes in Enlarged Negative Which are Hardly Visible in the Transparency 923
Producing a Sharp Image When Enlarging From a Small Transparency 913
Proper Exposure 914
Proper Exposure for Transparency 922
Securing Proper Illumination on Negative or Transparency to be Enlarged 908
Shadows not Transparent Enough 919
Spots Transparent and Semi-Transparent That are not Caused by Dust 925

Streaks and Marks on the Enlarged Negative 924
Transparency Plate Too Contrasty 915
Transparency Plate Too Dense 915
Transparency Very Thin, Shadows Filled With Detail 928
When Using Artificial Light Other Than Arc-Light the Entire Ground-Glass Not Evenly Illuminated ..921
White Spots, Irregular in Shape in the Enlarged Negative 931
Negative Enlarging—Easel 892
Negative Enlarging—Exposure 896, 897
Negative Enlarging—Exposure for Transparency.....879
Negative Enlarging—Focusing 725, 726, 893-895
Negative Enlarging—Introduction 869-881
Negative Enlarging, Kind of Plates to Use for 874
Negative Enlarging, Lens to Use for 886
Negative Enlarging—Making an Enlarged Transparency 901
Negative Enlarging—Making Small Size Negatives From Large Ones 906
Negative Enlarging—Making the Exposure 903, 904
Negative Enlarging—Making the Negative by Contact From the Large Transparency 902
Negative Enlarging—Making the Transparency by Contact 877
Negative Enlarging—Making Transparencies on Film 905
Negative Enlarging, Methods of 871
Negative Enlarging—Obtaining the Focus 888
Negative Enlarging—Quality of the Emulsion 875, 876
Negative Enlarging—Stops to Use 889, 890
Negative Enlarging—The Transparency 872, 873
Negative Enlarging—Using Ordinary Rapid Dry Plates 880
Negative Enlarging With a Bromide Enlarging Apparatus 891-907
Negative Enlarging With Large Camera 882-890
Negative Intensifying, General 129-140
Negative, Preparing the, for Retouching 954, 992-994
Negative, Print From Retouched .....Page 346
Negative, Print From Unretouched .....Page 345
Negative Reducing, General 257-290
Negative Retouched, Reproduction of .....Page 344
Negative Retouching—Introduction 936-949
Negative Retouching, Object of 936-940, 944-947
Negative Varnish—Cold and Hot .....Page 387
Negatives, Practice 991
Negatives, Proofing 995-997
Negatives That Can be Improved by Doctoring 292
Negatives to Intensify 134

Negatives to Reduce With Persulphate, Kind of 283, 284
Negatives, Working on Back of 1080-1088
Nitric Acid, Nature of 46
Non-Poisonous Developer for Enlarging 746-748

Object of Retouching 936-940, 944-947
Object of Retouching Desk 953
Obtaining the Focus—Negative Enlarging 888
Obtaining Vigorous Bromide Prints 865
Ointment Preventing Metol Poisoning 433-435
"Old Cedars," Study No. 1, by J. S. Neary .....Page 25
Old Developer, Action of 35, 36
Old Developer, Stains from 843
Old Developer, Use of 196
Old Pictures, Copying 601
"On the Frozen River," Study No. 8, by John Chislett .....Page 191
Original Size, Copying the, With Hand or View Camera 593
Orthol Developer for Gaslight Paper Post Cards 586
"Out Door Portrait," Study No. 10, by Mathilde Weil .....Page 223
Outfit, Retouching 952
Overcoming Abrasion Marks on Gaslight Paper 524-526
Overcoming Halation in Interior Photography, Example of ..Page 145
Over-Developed Plates, Reducing 204, 259
Over-Exposed, Treatment of Plate Slightly 209
Over-Exposure Corrected by Proper Development 202, 203
Over-Exposure Corrected by Proper Development, Illustration of .....Page 101
Over-Exposure in Portraiture 255
Over-Exposures, Developing 187-210
Over-Exposures, Developing Extreme 202, 203
Over-Exposures, Example of .....Page 115
Over-Exposures—Practice work 210
Over-Retouching, Avoid, Which Produces False Effects 1094
Over-Timed Plates, Advanced Development of 240-256
Over-Timed, Why Plates are 195

Paper, Cutting 863
Paper, Master One Brand of 845
Paper to Use, Grade of 858
Pencil for Marking on Glass, Illustration of .....Page 385
Pencil Holder and Leads, Illustration of Faber's .....Page 338
Pencil, Holding the 988, 989
Pencil, Illustration of Holding the .....Page 350
Pencilling Landscape Negatives 1074

Pencils 971, 972
Permanency of Sepia Tones on Gaslight Prints 553
Permanency—Re-Developing Process 779
Persulphate of Ammonia Formula 277
Persulphate of Ammonia, Nature of 286
Persulphate of Ammonia Reducer 261, 274
Persulphate of Ammonia Reducer Grows Stronger with Age..... 275
Persulphate of Ammonia, Reducing With 303
Persulphate of Ammonia, Traces of Hypo in 281
Picture, Copying the 598
Pin-Holes in Landscape Negatives 1091
Placing Bromide Print on Ferrotype Plate 801
Placing Negative in Position for Enlarging 724
Plans of Dark Room ..... Pages 15, 16, 21
Plate Appearing Yellow After Reducing 269
Plate Developed Too Far Before Restraining 206
Plate, Proper Color of 50
Plates Becoming Stained While Intensifying 142
Plates, Developing Different Brands of 198-200
Plates, Double Coated 45
Plates Hardened in Alum, Reducing 280
Plates Lacking Strength, Avoid Printing from 144
Plates to be Reduced, Judging 273
Plates to Use for Copying 599, 631, 632
Plates to Use for Experimenting 153, 154
Plates to Use for Local Intensifying Experiments 176
Plates to Use for Making The Transparency—Negative Enlarging 878
Plates to Use for Negative Enlarging, Kind of 874
Platino-Bromide Paper 667
Pocket Film Kodak, Daylight Enlarging With a 686-694
Pointers—Bromide Enlarging 833-868
Poisoning, Metol 432, 586
Portrait, Study No. 9, by E. A. Brush ..... Page 192
Portrait, Study No. 17, by B. J. Falk ..... Page 349
Portrait, Study No. 19, by John H. Garo ..... Page 368
Portraiture, Over-Exposure for 255, 256
Portraiture, Under-Timing 101
Position at Retouching Desk 998, 999
Positive and Negative Compared 979-984
Post Cards, Developing Formula for Gaslight Paper 584
Post Cards, Developing Outfit for Gaslight Paper 578, 579
Post Cards, Drying—Gaslight Paper 588, 589
Post Cards, Fixing Bath for Gaslight Paper..... 585
Post Cards—Gaslight Paper 576-589

Post Cards—Grade of Gaslight 576, 577
Post Cards—Washing Gaslight Paper 587
Practice Negatives 991
Practice Work—Developing Under-Exposures 119
Practice Work—Gaslight Printing and Developing 452-454
Practice Work—Over-Exposures 210
Practice Work—Sepia Tones on Gaslight or Bromide Papers ..574, 575
Practice Work—Special Printing and Developing of Gaslight Papers 527-529
Preparatory Instruction—Retouching 950-978
Prepared Re-Developing Solutions for Gaslight Papers 563
Preparing Apparatus for Artificial Light 698-703
Preparing a Ten Per Cent. Solution of Bromide of Potassium 201
Preparing Plate to Receive the Intensifier 137, 138
Preparing the Apparatus for Daylight Enlarging 695,-697
Preparing the Bleaching Solution for Gaslight Sepias 564
Preparing the Developer for Enlarging 731,732
Preparing the Gaslight Re-Developing Solution 565, 566
Preparing the Negative for Retouching 954, 992-994
Preserving the Negative 7
Preserving the Pyro 60
Preventing Unmounted Prints from Curling 796
Print from Retouched Negative .....Page 346
Print from Unretouched Negative .....Page 345
Printing and Developing Gaslight Papers—Brief General Instruction 390-408
Printing and Developing Gaslight Papers—Detailed Instruction 409-454
Printing—Copying 605
Printing Dodges for Gaslight Paper 487-493
Printing Gaslight Papers With Electric Light 417-420
Printing Gaslight Papers With White Margin 582, 583
Printing Light and Printing Gaslight Paper Post Cards 580
Printing Light for Gaslight Paper 393, 411
Prints Appear Dark in Dark Room 833
Prints Immersed, Keep 852
Prints Sticking Together 842
Proofing Negatives 995-997
Proper Color of Plate 50
Proper Copying Light 596, 626, 627
Purchasing Bromide Paper 676
Pyro Developer, Action of 108
Pyro Developer for Commercial Photography 357-379
Pyro Developer, Formula for 47-49
Pyrogallic Acid, Nature of 46

Quality of Negative Best Suited for Bromide Enlarging 723
Quality of the Emulsion—Negative Enlarging 875, 876
Quantity of Developer to Use 856
Quick Development of Bromide Prints 866

Rapidity of Making Sepia Tones on Gaslight Prints 555
Rapid Sepia Tones by the Bleaching and Re-Developing Process.778-788
Rapid Sepia Toning Bath for Bromide Papers, A 775-777
Re-Developing Bath, Life of the 567
Re-Developing Bath That Will Not Blister, A Special 568-573
Re-Developing Process, Bleaching Solution for 782, 783
Re-Developing Process—Blisters 787
Re-Developing Process—Manipulation 786
Re-Developing Process—Permanency 779
Re-Developing Process, Rapid Sepia Tones by the Bleaching and 778-788
Re-Developing Process, Uniformity of.....780
Re-Developing Solution for Gaslight Papers, Prepared 563
Re-Developing Solution for Re-Developing Process 783-785
Re-Developing Solution, Preparing the 565, 566
Re-Developing Stock Solution for Sepia Tones on Gaslight Paper..557
Red Prussiate of Potash 260
Red Prussiate of Potash, Formula for Reducing With 265
Red Prussiate of Potash, Nature of 285
Reducer, Action of 262
Reducer, Applying, With the Brush 296
Reducer, Applying, With the Finger or Tuft of Cotton 299
Reducer, Persulphate of Ammonia 261, 274
Reducer, Red Prussiate of Potash 260
Reducer to Films, Applying the.....304-306
Reducing.....278, 279
Reducing, Clearing the Plate or Film After.....270
Reducing, General Negative.....257-290
Reducing High-Lights and Fog 1069-1073
Reducing, Local 291-306
Reducing Over-Developed Plates 204, 259
Reducing Plates After They are Dry 271, 301, 302
Reducing Plates Hardened in Alum 280
Reducing Solution, How to Keep 272
Reducing Solution, Life of 272
Reducing the Plate 268
Reducing With Persulphate of Ammonia 303
Reducing With Persulphate of Ammonia—Difficulties 317-321
Confining Solution to Only the Parts to be Reduced 321

Parts of Negatives Reduced With Persulphate Stained 319
Persulphate of Ammonia Bath Reducing Too Quickly....318
Persulphate of Ammonia Not Reducing 317
Plates Very Glossy After Reducing 320
Reducing With Red Prussiate of Potash, Formula for 265
Reducing With Red Prussiate of Potash—Difficulties 307-316
Negatives Reducing in Clearing Solution 316
Negatives Reducing Too Quickly 308
Negatives Reducing Too Slowly 307
Negatives Stained a Reddish Yellow After Reducing.....311
Negatives Streaked After Reducing 312
Negatives Will Not Reduce 309
Negatives Yellow After Reducing 313
Reducing Shadows Too Much 310
Removing Yellow Stain from Negatives After Reducing 314
Surface of the Plate Puckering After Going Through Clearing Solution 315
Reflector for Retouching Desk 978
Re-Intensifying 139
Removing Imperfections on Negatives—Difficulties 1015-1029
Applying Dope 1016
Applying Varnish 1017
Cannot Remove Blemishes 1027
Cannot See Imperfections 1019
Eyes Becoming Tired 1022
Finger Marks on Negatives 1026
Fingers and Hand Become Cramped.....1024
Imperfection Becomes Too Black 1028
Lead Scratching 1021
Line Around Edge of Dope 1018
Position at Desk Tiresome 1023
Proper Light 1020
Removing Retouching Medium 1029
Wrist and Forearm Become Tired 1025
Removing Stains from Bromide Prints 868
Removing the Retouching 968-970
Removing Varnish from Negatives .....Page 388
Removing Varnish from Plates to be Intensified 151
Removing Varnish With Turpentine 152
Removing Yellow Stains from Gaslight Prints 521-523
Reproduction of Negative Before Retouching .....Page 343
Reproduction of Negative Retouched .....Page 344
Restraining Development 32, 33
Restraining, Plate Developed Too Far Before 206

Restraining the Plate Too Quickly 205
Restraining the Sensitive Emulsion 194
Retouching Architectural Subjects 1064, 1065
Retouching—Blending 1030-1053
Retouching—Classified Subjects 948
Retouching Desk 973-977
Retouching Desk, Illustration of .....Page 339
Retouching Desk, Object of 953
Retouching Desk, Position at the 998, 999
Retouching Desk, Reflector for 978
Retouching Dope to the Negative, Applying the 960-963
Retouching—General Explanation 979-989
Retouching Landscape and Architectural Negatives 1061-1096
Retouching Landscape Subjects 1062, 1063
Retouching, Learning 949
Retouching, Materials Required for 951
Retouching Medium 955-959
Retouching—Negative and Positive Compared 979-984
Retouching, Object of 936-940, 944-947
Retouching Outfit 952
Retouching—Preparatory Instruction 950-978
Retouching, Preparing the Negative for 954, 992-994
Retouching, Removing the 968-970
Retouching, Reproduction of Negative Before .....Page 343
Retouching, Secret of 990
Retouching—The Stroke 1000-1013
Retouching Trees.....1075-1079
Retouching Varnish.....964-966
Rinse Water, Acidified, for Gaslight Papers..... 442
Rocking Tray While Intensifying 141
Royal Bromide Paper 672, 673
Rusty, Green Tones on Bromide Paper 836

Salt Bath for Enlarging, Formula for 744
Screen for Enlarging Camera, Lens 720
Scum on Surface of Gaslight Prints 519, 520
Secret of Retouching 990
Sensitive Emulsion, Construction of 189-191
Sensitive Emulsion, Restraining the 194
Sensitive Side of Bromide Paper 862
Sensitiveness of Bromide Paper 677
Sepia and Green Toned Bromide Prints 771-793
Sepia Tones by the Bleaching and Re-Developing Process, Rapid 778-788
Sepia Tones on Gaslight or Bromide Papers 552-575

Sepia Toning Bath for Bromide Papers, A Rapid 775-777
Sharpening the Lead 985-987
"Sheep," Study No. 5, by W. E. Bertling .....Page 97
Shelving, Dark Room 18
Silver Intensifier, Monckhoven's .....Page 72
Size of Enlargement 692
Size of Trays 855
Sky to Landscape, Adding 1093
Snap and Crispness of Negative 37
"Snow Lights," Study No. 7, by Geo. H. Scheer, M.D.....Page 137
"Soft" Bromide Paper 666
Solution, Mixing 854
Special Developing Formula for Gaslight Paper 495
Special Development of Gaslight Papers 494-506
Special Formula for Strengthening Negatives of Uncertain Fixing 148, 149
Special Printing and Developing of Gaslight Papers 481-529
Special Printing and Developing of Gaslight Papers—Difficulties 530-551
Black Spots 541
Chloride of Lime Solution Not Reducing or Clearing the Whites 551
Edges of Vignette Bleaching Too Rapidly When Using the Chloride of Lime 550
Grayish Whites 538
No Contrast 547
Parts of the Print Will Not Develop, Leaving White Spots—Spots Blending at the Edge Like a Vignette 540
Prints Becoming Yellow All Over in Hypo 535
Prints Becoming Yellow in Spots While in the Hypo 534
Prints Developing Irregular, Freaky and in Streaks.....537
Prints Stained Around the Edges 539
Prints Turn Brown in Hypo Bath 548
Prints Yellow and Bleached After Treating With a Little Red Prussiate Solution 549
Prints Yellow Before Placing in Hypo 533
Prints Yellowing During Washing 536
Shadows Too Black Before Sufficient Detail Has Been Produced in the High-Lights 530
Small Yellow or Purple Stains 542
Stains on Edges of Vignette 531
Tone Blue-Black, Whites Having a Grayish Tint 545
Tone of Print Brown 544

Too Much Contrast 546
White, Milky Deposit on Prints 532
White Spots 543
Special Printing and Developing of Gaslight Papers—Practice Work 527-529
Special Pyro Developing for Commercial Photography 357-379
Special Tones on Bromide Paper 789-793
Special Tones on Gaslight or Bromide Papers—Practice Work.574, 575
Splatter Work on Landscape Negatives 1089, 1090
Spotting or Touching Up Bromide Prints 803
Squeegeeing Enameled Surface Gaslight Prints 450, 451
Stains From Bromide Prints, Removing 868
Stains From Old Developer 843
Stains on Edges of Print 850
Standard Bromide Paper 668
Stopping Action of Developer 834
Stops to Use for Copying 600
Stops to Use—Negative Enlarging 889, 890
Strengthening Plate Without Clearing 143
Strength of Solution to Use for Local Reducing 295
Stroke, The—Retouching 1000-1013
Studies Illustrating This Volume Were Made, How the.....Page 389
Study No. 16, by Alfred Holden .....Page 317
Subjects, Classified—Retouching 948
Sulphite of Soda in Gaslight Developer, Nature and Use of 423
Sulphite of Soda, Nature of 46, 289
Sulphuric Acid, Nature of 46, 290

Tank Development With Pyro 107
Tank, Washing, Illustration of .....Page 18
Temperature—Enlarging 750, 853
Test for Exposure of Gaslight Paper 421
"The Last Sheaf," Study No. 14, by H. B. Conyers .....Page 289
Theory of Developing 22-25
Theory of Fixing 26, 27
"The Splinter," Study No. 12, by Mrs. Nancy Ford Cones ...Page 263
Thorough Washing of Bromide Prints 867
Toning Bath for Bromide Papers, Cold Hypo 771-774
Traces of Hypo in Persulphate Bath 281
Transparency by Contact, Making the—Negative Enlarging.....877
Transparency, Plates to use for Making the—Negative Enlarging...878
Transparency, The—Negative Enlarging.....872, 873
Trays.....857
Trays, Cracked 841

Trays for Developing, Use of Two 197
Trays for Enlarging 734, 735
Trays, Size of 855
Treatment of a Plate Slightly Over-Exposed 209
Treatment of a Plate Which You Know Before Developing to be Over-timed 207, 208
Trees, Retouching 1075-1079
Trial Exposures 846
Trimming Gaslight Papers While Wet 408, 448
Trimming Gaslight Prints When Dry 449

Under-Exposures 38-44
Under-Exposures, Developing 95-118
Under-Exposures, Developing—Practice Work 119
Under-Timing Portraiture 101
Uniformity of Gaslight Prints 554
Uniformity of Re-Developing Process 780
Universal Developer, Directions for Using 332-337
Universal Developer, Formula for 328-331
Universal Developer, Important Notes on 338-341
Universal Developing 322-341
Universal Developing—Difficulties 342-356
Developer Discoloring After Having Been Prepared Only a Short Time 343, 344
Developing Heavy Shadow Lightings 342
Negatives Drying With a Coarse Grain 345
Negatives Too Strong in Color—Yellow 347
Negatives Which Appeared Sufficiently Developed, Very Thin After Fixing 349
No Detail in High-Lights 354, 355
Plate Developing Flat 353
Plate Inclined to Develop Contrasty 351
Proper Detail in Shadows 350
Retaining Soft Detail in Shadows 356
Securing Half-Tones in High-Lights 352
Shadows Fogging During Development 346
Testing Old Sulphite of Soda Solution 348
Unmounted Bromide Prints, Flattening 795
Unmounted Prints, From Curling, Preventing 796
Un-Retouched Negative, Print From ..... Page 345
Use Discarded Plates or Films for Experimenting 263
Use of Home-Made Enlarging Camera With Daylight 717-719
Use of Old or Once-Used Developer 196
Use of Two Trays for Developing 197

Use Running Water to Check Development in Local Reducing 297
Using Ordinary Rapid Dry Plates 880
Using Silk Bolting Cloth for Enlarging 759-761

Varnish, Removing, From Negative.....Page 388
Varnish, Retouching 964-966
Varnish to the Negative, Applying the 967
Ventilation of Dark-Room 11
Ventilating the Dark-Room, Illustration of a Simple Method for .....Page 14
View Camera, Copying With Hand or 590-634
Vignetting—Enlarging 751, 752
Vignetting Gaslight Prints 507-517
Vignetting Gaslight Prints, Method of Procedure for 514-517

Washing After Fixing 5
Washing and Fixing Bromide Prints 838
Washing Box 16
Washing Bromide Enlargements 749
Washing Gaslight Paper Post Cards 587
Washing Gaslight Prints 444
Washing Tank, Illustration of .....Page 18
Weights and Measures 59
When to Apply the Intensifier Locally 175, 178
When to Stop Action of Intensifier 140
White Drapery, Doctoring 293, 294
White Light 849
Why a Weak Intensifying Solution is Used 171, 172
Why Plates are Over-Timed 195
" Woodland Mist," Study No. 2, by Wm. T. Knox .....Page 43
Working Around the Face—Blending 1046-1053
Working on Back of Negatives 1080-1088

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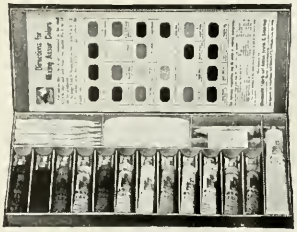

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